TOWN OF LUNENBURG, MASSACHUSETTS

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

Phase IV
Final Recommended
Wastewater Management Plan

Final - March 2010
Updated - April 2016

WRIGHT-PIERCE
Engineering a Better Environment

LUNENBURG CWMP

PHASE IV - FINAL RECOMMENDED

WASTEWATER MANAGEMENT PLAN

UPDATED APRIL 2016

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EXECUTIVE SUMMARY

This updated report, entitled "Lunenburg, Massachusetts – Comprehensive Wastewater Management Plan – Final Recommended Wastewater Management Plan", presents an updated to the final phase of a four phase planning process undertaken by the town of Lunenburg to determine the viability of current wastewater management practices in satisfying existing and projected future wastewater needs through a 20-year planning period, year 2036. This report summarizes an evaluation of recommendations to address issues with conventional (traditional) on-site subsurface wastewater disposal systems serving specific areas of town. The recommended plan has been developed in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Comprehensive Wastewater Management Planning (CWMP) guidelines to address the identified areas of need and provides the framework for near and long-term wastewater management for the Town.

The four CWMP phases are:

Phase I:	Assessment of existing conditions, projection of future wastewater disposal requirements, and a needs assessment for the Town. The needs assessment determined areas with need for further study, (was not updated);
Phase II:	Identify and short-list appropriate means of handling the wastewater management methods to address the areas identified in Phase I. The analysis included a review of technical, environmental, institutional, and economic factors, (was not updated);
Phase III:	Detailed evaluation of alternatives identified and shortlisted in Phase II, and a preliminary recommendation of a specific wastewater management plan for each area. Was not updated; and
Phase IV:	Finalized specific wastewater management plan for each area. Updated in April 2016.

The CWMP evaluated whether or not conventional (traditional) on-site Title 5 septic systems are providing adequate means of sanitation, environmental protection, and growth management within the Town today and through a 20-year planning period. Phases I - III were not revisited in the 2016 update, and MassDEP and MEPA were not involved in the final 2016 update.

ES.1 REASONS FOR STUDY

The town of Lunenburg has been involved in the wastewater planning process in various forms since the early 1970s and has implemented a regional wastewater management solution (sewer connections to both Leominster and Fitchburg) for specific areas of the Town. The Town determined in 2006 a review was necessary due to three major factors: 1) a concern for areas of Town that are not well suited for conventional (traditional) on-site subsurface wastewater disposal systems; 2) population growth concerns; and 3) the limited capacity for sending wastewater to nearby municipal facilities for treatment and disposal. An update to the original Phase IV CWMP was necessary due to rising costs for sending flow to the city of Fitchburg. Alternatives were investigated for sending future flow in Needs Areas to Leominster instead.

ES.2 PHASE I - NEEDS ASSESSMENT

The needs assessment identified and evaluated the suitability of properties for continued, long-term reliance on conventional (traditional) on-site wastewater disposal systems. Phase I determined that the Town has 11 areas with need for further study, or "needs areas". This final grouping established a baseline for the Areas to be considered in Phase II. The Needs Areas are listed in Table ES-1.

TABLE ES-1
AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location Name
4	Lower Massachusetts Avenue
6	Baker Station
9	Lake Whalom
10	Massachusetts Avenue / Beal Street
12	Highland Street
14	Hickory Hills Lake
15	Rolling Acres Road
19	Lake Shirley
24	Squannacook
25	Pioneer GMD*
26	Chase GMD*

* Growth Management District (Industrial/Commercial)

The Phase I Report was submitted to the Town and the Massachusetts Department of Environmental Protection (MassDEP) on May 7, 2007. A public meeting to present the Phase I Report to the Town was held on May 17, 2007.

ES.3 PHASE II - ALTERNATIVES ANALYSIS

Phase II identified, described and evaluated several alternatives to address wastewater treatment, collection and effluent disposal for the "Needs Areas", identified in Phase I. The alternatives described were then analyzed for their applicability to each needs area and a short list of recommendations was established for wastewater management alternatives in the identified Needs Areas. Specific recommendations included a review of the appropriateness of utilizing septage management plans, I/A systems, decentralized, local and/or regional wastewater collection, treatment and disposal facilities. The Phase II Report was submitted to the Town and the MassDEP on October 22, 2007.

ES.4 PHASE III - DRAFT RECOMMENDED PLAN

Phase III included a detailed evaluation of wastewater collection, treatment, and disposal alternatives identified and shortlisted in Phase II. Several environmental and economic factors were considered in the evaluation of the alternatives. Each needs area was analyzed to determine

potential effects caused by the various alternatives. The factors were weighted based on each needs area's sensitivity/applicability to the various factors and were assigned rankings. The weighted rankings were used as the basis for the selection of the preliminary recommended plan. In addition, wastewater management techniques were recommended to help control and maintain existing and future infrastructure. The Phase III report was submitted to the Town, MassDEP, and the Massachusetts Environmental Policy Act Office (MEPA) on March 31, 2008.

ES.5 PHASE IV - FINAL RECOMMENDED PLAN

Phase IV includes the updated recommended plan for wastewater management for the town of Lunenburg. Figure ES-1 includes a map of Lunenburg highlighting the revised Needs Areas, growth management district, Needs Areas with need for further study and the areas identified for a septage management plan. Figure ES-2 highlights the Sewer Service Area boundaries including all Sewer Service Zones that were adopted with the new sewer bylaw at the annual Town meeting in May 2009, and the Town adopted the updated Sewer Service Area Map at the 2014 annual Town meeting. Sewer Service Zones are simply the new terminology for "Needs Areas".

February 6, 2008 12:21:14 PM W:\GIS_Info\ArcMapLayout\template\11x17-Landscape.mxt

Source:
Town of Lunenburg
MassGIS
Wright-Pierce

N

TOWNSEND

FITCHBURG

Hickory Hills Lake

Study Area 10

Study Area 12

Study Area 14

Study Area 15

Study Area 4

Study Area 9

Study Area 6

Lake Whalom

Massapoag Pond

Lake Shirley

Study Area 19

Study Area 25

SHIRLEY

LANCASTER

13

2A

12

2

190

HOLLIS RD

Legend

Major Sub Basins

Minor Sub Basins

Study Areas

Need
Areas Recommended For Wastewater Management

Need
Areas Recommended For Further Study

Septic
Conventional Onsite/Septic Management Plan

Excluded Parcels

Protected Lands

Existing Sewer

Private Onsite Sewer (Groundwater Discharge)

0 3,000 6,000 Feet

Source:
Base data obtained from the Town of Lunenburg and MassGIS.
Study areas developed by Wright-Pierce

Comprehensive Wastewater Management Plan Update

Lunenburg, Massachusetts

Needs Areas

PROJ NO:	DATE:	FIGURE:
13382A	Apr 2016	ES-1

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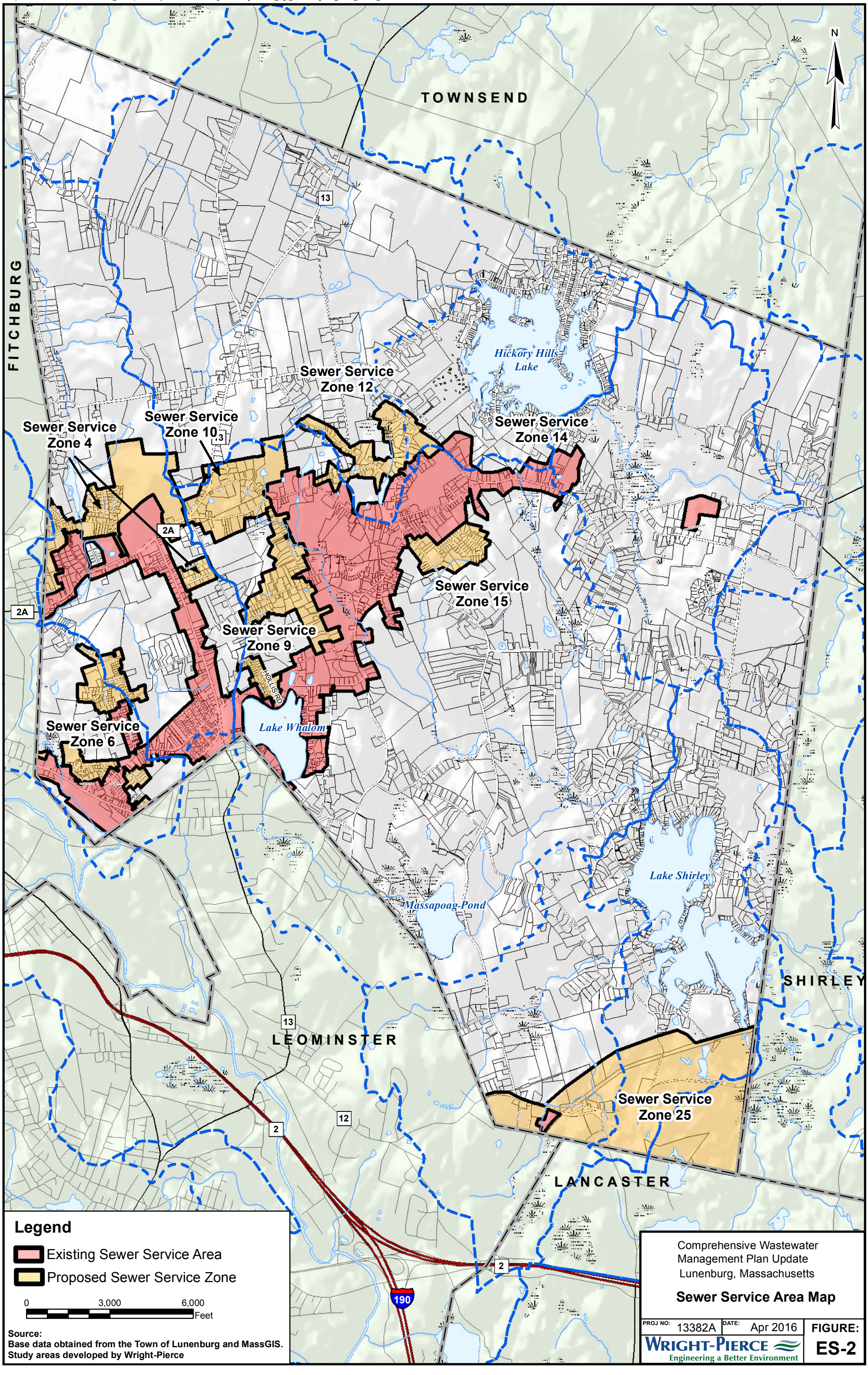
September 15, 2009 8:43:39 AM W:\GIS_Development\Projects\10849-Lunenburg\Phase4\Figures\New_Figs_4-27-09\FigES-2_Sewer_Service_Area-11x17.mxd



ES.5.1 Collection System Recommendation

The collection systems proposed in the recommended plan will be designed to transport wastewater generated in the Needs Areas to locations that can adequately treat and dispose of the wastewater. Conventional (traditional) collection systems are recommended for areas where ground topography and other factors make it the most appropriate engineering design. Low pressure sewers are recommended for areas that are flat, subject to poor soils, ledge and high groundwater, and are not likely to be subject to future extensions.

ES.5.1.1 Conventional Gravity Collection Systems

In conventional (traditional) gravity collection systems, wastewater flows by gravity from the building through a service connection to a street or easement sewer and then through a piping network to a common collection system point (typically a low point in the system). At this location, a centralized pump station is typically installed to pump the wastewater to another downstream section of gravity sewer or to transport the wastewater to its final destination for treatment and disposal. Conventional (traditional) systems are prevalent throughout New England. The town of Lunenburg has conventional (traditional) sewers throughout its existing collection system, concentrated in the center of Town, Whalom area, west and southwest sections of Town.

Conventional (traditional) systems are often preferred over low pressure type systems because the municipality is in control of all the mechanical system components and has the ability to maintain the system on its own schedule. Conventional (traditional) systems also typically have centralized pumping stations which are fewer in number as compared to the individual grinder pumping stations associated with a low pressure system. Conventional (traditional) systems are relatively simple and reliable systems. Low pressure sewers are generally more complex than conventional (traditional) systems (due largely to the number of pumping units) and are also quite reliable.

ES.5.1.2 Low Pressure Sewers

A low pressure sewer system includes an individual grinder type pumping system which conveys wastewater generated from the house or business into a low pressure piping network where it is transported to a central location such as a receiving gravity sewer, pump station or treatment facility. The piping system requires smaller "open cuts" during installation compared to a conventional (traditional) system due to the shallower depth of burial. Each home or business uses a grinder pump to discharge to the low pressure main.

Low pressure systems have proven to be viable collection system alternatives especially in low-lying areas with high groundwater or shallow depth to bedrock. Low pressure sewer systems also work well in extremely hilly areas and waterfront areas where deep excavations and extensive dewatering could cause environmental harm. Additionally, low pressure systems are well suited for installation in areas adjacent to surface water, which are subject to periodic flooding, areas with relatively flat terrain, areas with perched groundwater, areas with narrow streets and areas with shallow depth to bedrock.

There are several components of a low pressure system located on private property, including internal building plumbing between the house and the grinder pump, the wetwell sump/pump structure that houses the grinder pump and stores the wastewater from the building, the alarm and control panel for the pump system and associated electrical wiring, discharge pressure piping to the street pressure piping network and an isolation valve at the property line (a check valve is included within the pump housing). The Town decided to place ownership, construction and operation and maintenance responsibility (including costs) on the property owner during construction of Phase IV sewer service zones in Areas 6 and 9 in 2015.

The grinder pump stations will provide a holding capacity to provide wastewater storage for normal operation and during most electrical power outages. Different wetwell holding capacities are available. The typical holding tank capacity ranges from 50-150 gallons. When power outages are experienced, water use significantly decreases and the amount of wastewater discharged to the pump station is decreased. The pump owners need to be cognizant of the fact that during a power outage, they should only use water as necessary. In addition, the pump unit could be powered by a home emergency power generator, if desired.

ES.5.2 Wastewater Management Considerations

The wastewater management plan was revised and updated with each phase of the CWMP process. The Phase III report included a draft recommended plan. The recommended plan was utilized to develop the final plan included in this report, which was updated in 2016. The original revisions were based on comments from the MEPA office, the MassDEP, the Natural Heritage and Endangered Species program (NHESP), the Nashua River Watershed Association (NRWA), Lunenburg residents, and Lunenburg Land Boards including the Sewer Commission, Board of Health and the Planning Board. The 2016 update was based only on review comments by the Lunenburg Sewer Commission.

Key revisions to the recommended plan in 2010 included:

- Altering the Needs Areas to match the proposed Sewer Service Area (refinement of Needs Areas);
- Altering the recommendations for a revised IMA agreement with Leominster;
- Removing the growth management provisions for Chase Road Area (Area No. 26);
- Revising collection system recommendations for GMD #25 (Pioneer Drive); and
- Removing the Lakes Areas (Hickory Hills and Lake Shirley) from the implementation plan and recommending such for further study.

Key revisions to the recommended plan from the 2016 update included

- Re-routing Sewer Service Areas 4 and 10F to discharge to Leominster;
- Updating Areas 6 and 9 to reflect sewer system construction completed in 2015.

The Phase III report was filed with MEPA and the Town received a certificate in May 2008, which required the completion of a Draft Environmental Impact Report (EIR). The requirement for the DEIR included several tasks associated with potential impacts to the Lakes regions. The Town subsequently decided to create Priority and Secondary Needs Areas. The Priority Needs Areas include Area 9 - Lake Whalom, Area 6 - Baker Station, Area 4 - Lower Massachusetts

Avenue, Area 10 - Massachusetts Avenue/Beal Street, Area 12 - Highland Street, Area 15 - Rolling Acres Road, and Area 25 - Pioneer Drive. These areas are included in the final recommended plan and the implementation plan. The Secondary Areas include Area 19 - Lake Shirley and Area 14 - Hickory Hills Lake. The Secondary areas will not be included in the implementation plan and are recommended for "further study".

ES.5.3 Wastewater Management Techniques

There are several wastewater management techniques recommended for the town of Lunenburg. The Town experienced several growth and development impacts due to the installation of a regional collection system (Contracts 1 and 2 of the Phase I sewer extension projects). The Town should continue to work on establishing wastewater management programs, so that these potential impacts will be controlled/minimized going forward.

In order to manage and operate the existing and proposed wastewater collection, transmission and treatment facilities, the Town should implement institutional and system management procedures prior to future infrastructure construction. The recommendations include water conservation, stormwater management, nutrient management, and a Septage Management Plan (SMP).

ES.5.3.1 Septage Management Plan

A Septage Management Plan (SMP) with a defined septage management overlay is recommended. A SMP legally identifies the septage management boundaries and allows the Town to set on-site system management policies. A SMP will include areas of Town proposed for long-term on-site wastewater disposal as well as those areas proposed for future infrastructure until such time as the wastewater management plan is implemented in those areas. The successful long-term sustainability of on-site wastewater disposal systems is dependent on proper operation and maintenance in order to prevent adverse health and environmental impacts. It is recommended that the Sewer Commission work closely with the local Board of Health in order to develop the SMP.

ES.6 RECOMMENDED WASTEWATER TREATMENT AND DISPOSAL

The recommended plan includes regional wastewater disposal at the city of Fitchburg’s Easterly Wastewater Treatment Facility and the city of Leominster’s Wastewater Treatment Facility.

ES.6.1 Regional Recommendations to Leominster

It is recommended that Lower Massachusetts Avenue (Area 4), Baker Station (Area 6), Lake Whalom (Area 9), Massachusetts Avenue/Beal Street (Area 10), Highland Street (Area 12), Rolling Acres Road (Area 15), and Pioneer Drive (Area 25) transport the generated wastewater to Leominster's existing wastewater treatment facility. The Sewer Commission should continue discussions with Leominster for additional flow capacity and revise the current intermunicipal agreement (IMA). The revised IMA should include a "capacity contingency".

ES.6.2 Regional Recommendations to Fitchburg

As part of the 2016 CWMP update, it is no longer recommended that Lower Massachusetts Avenue (Area 4) and Massachusetts Avenue/Beal Street (Area 10F) transport the generated wastewater to Fitchburg's existing Easterly Wastewater Treatment Facility. After the recommended re-direction of Area 4 and Area 10F occurs, only a portion of the existing wastewater flow would continue to flow into Fitchburg's wastewater collection system. The existing and future flows projected for 2036 do not exceed the current IMA with Fitchburg; which was re-negotiated in 2013 for 151,000 gpd.

SECTION 1

INTRODUCTION

1.1 PURPOSE/BACKGROUND INFORMATION

In July 2006, the town of Lunenburg retained Wright-Pierce to prepare a Comprehensive Wastewater Management Plan (CWMP). The CWMP addresses current and future wastewater management needs, wastewater management alternatives, and develops a recommended plan through careful review and evaluation of management alternatives. Although there are some areas of town that are served by connections to adjacent communities' municipal wastewater collection systems or privately owned treatment facilities, the Town primarily relies on conventional, on-site Title 5 systems for wastewater treatment and disposal. The Single Environmental Impact Report (SEIR) filed by the Town in December 2001 stated that many of these systems are older, located in poor soil conditions and/or are considered substandard under the Commonwealth's Title 5 regulations. The certificate from the Secretary of the Executive Office of Environmental Affairs (EOEA) dated March 18, 2002, for the original SEIR is included in Appendix A.

In the spring of 2001, the construction of Phase I sewers began as recommended by the approved Lunenburg Wastewater Facilities Plan (June 1999). The Phase I sewer construction consisted of two construction contracts and connected new sewers serving the Town Center and Whalom areas to existing sewers in Leominster and Fitchburg. Upon the completion of Phase I sewers, construction of later phases were postponed pending further study and investigation of the Town's overall wastewater management needs.

The further study and investigation of wastewater management is included in the CWMP. The CWMP is a multi-phase planning evaluation undertaken by the town of Lunenburg to determine the viability of current wastewater disposal practices in satisfying existing and projected future wastewater treatment and disposal needs through the year 2026. This 2016 update to the Phase IV CWMP projects wastewater needs and flows through 2036. In addition to evaluating future wastewater treatment and infrastructure needs within the currently sewered areas, the CWMP provides a comprehensive look at the Town's wastewater management needs by including reviews of the previous studies along with a "fresh look" at the Town's needs as a whole.

The assessment was performed to review whether or not conventional, on-site Title 5 septic systems can provide adequate means of providing for sanitation, environmental protection and growth management within Town today and through the 20-year planning period. For the purposes of this report, wastewater management needs have been evaluated in the following five categories:

- **Public Health--**correction or avoidance of unsanitary conditions such as effluent surfacing over a leaching field, inadequate set-back from a private well, or direct discharge of sanitary wastewater to a watercourse.

- **Water Supply Protection--**preventing contaminants (such as bacteria, viruses or nutrients) from reaching private or public drinking water sources.

- **Protection of Surface Waters--**such as reducing nutrients (typically phosphorus) that can cause accelerated degradation of freshwater ponds.

- **Preserving Community Character--**highlighting areas of sensitivity particularly in regards to potential impacts of wastewater alternatives. Sensitive areas that were included in the assessment were Areas of Critical Environmental Concern (ACECs), Priority/Estimated Habitat Areas, Open Space/Protected Lands and the Historic District.

- **Managed Growth--**providing wastewater treatment and disposal so that conventional Title 5 system conditions (such as impermeable soils or shallow groundwater) are not the limiting factors to managed growth and development. The Town continues to develop planning and regulations for managed growth.

The established Needs Areas from the Phase I and the original 2010 Phase IV CWMP were not revisited in the 2016 update.

1.2 REVIEW OF PLANNING EFFORTS

The town of Lunenburg, through its CWMP, continues to assess its current wastewater treatment and disposal methods and is evaluating alternatives for improved wastewater treatment and disposal. The DEP approved scope of work for the CWMP is included in Appendix B.

This document is Phase IV of the four phase CWMP process prescribed by DEP's Guide to Comprehensive Wastewater Management Planning. The four phases are:

Phase I:	Assessment of existing conditions, projection of future wastewater treatment and disposal requirements, and a needs assessment for the Town. The needs assessment determined areas with need for further study for Phase II;
Phase II:	Identified and short-listed appropriate means of wastewater management methods to address the areas identified in Phase I. The analysis included a review of technical, environmental, institutional and economic factors;
Phase III:	Detailed evaluation of alternatives identified and short-listed in Phase II, and a recommendation of a specific wastewater management plan for each area; the CWMP was filed with MEPA (Notice-of-Project Change) at the end of Phase III to provide a public comment period for the Town and State Agencies and other shareholders;
Phase IV:	Finalize specific recommended wastewater management plan for each area. Updated in April 2016.

The Phase I Existing Conditions, Future Requirements and Problem Identification/Needs Assessment report was completed in the Spring of 2007 and submitted to the Massachusetts Department of Environmental Protection (MassDEP) on May 7, 2007. The Phase I document provided a comprehensive look at the Town's wastewater management needs by including

reviews of the previous studies along with a "fresh look" at the Town as a whole. The Phase I needs assessment identified the suitability of properties for continued, long-term reliance on conventional, on-site wastewater disposal systems. The needs assessment provided a review of the entire Town and determined areas that:

- Are well suited for conventional, on-site wastewater disposal systems for long-term wastewater management;
- Will be further studied for continued reliance on conventional, on-site septic systems for long-term wastewater management; or
- Will be reviewed for potential growth management of industrial and commercial development.

Of the 26 total study areas evaluated in Phase I, 15 study areas were determined to be well-suited for the continued use of on-site systems. Some of these areas showed small pockets of "needs".

The Tier 1 and Tier 2 analyses determined that the Town had 10 areas with need for further study, or "Needs Areas". This final grouping established a baseline for the areas considered in the Phase II CWMP. Wastewater management alternatives for each area that were investigated in this phase included utilizing management techniques, I/A systems, local and/or regional wastewater collection, treatment and disposal facilities, effluent disposal and continued use of on-site Title 5 systems. The areas with need for further studied identified in Phase I are listed in Table 1-1. The Town did not update the Phase I report in 2016.

TABLE 1-1
AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location Name
4	Lower Massachusetts Avenue
6	Baker Station
9	Lake Whalom
10	Massachusetts Avenue / Beal Street
12	Highland Street
14	Hickory Hills Lake
15	Rolling Acres Road
19	Lake Shirley
24	Squannacook
25	Pioneer GMD*

* Growth Management District (Industrial/Commercial)

The Phase II Management Techniques and Alternatives Identification and Screening report was completed in the fall of 2007 and submitted to the Town and MassDEP on October 22, 2007. The Town did not update the Phase II report in 2016. The Phase II report included the identification and description of several alternatives to address wastewater treatment, collection and effluent disposal for the areas with need for further study identified in the Phase I report.

The alternatives described were then evaluated for their applicability to each Needs Area and a short list of recommendations was established for wastewater management alternatives in the identified Needs Area. Specific recommendations included a review of the appropriateness of utilizing septage management plans, I/A systems, decentralized, local and/or regional wastewater collection, treatment and disposal facilities and residuals treatment and disposal.

The Phase II report included an analysis of wastewater collection, treatment and effluent disposal alternatives. These management alternatives were evaluated for each Needs Area. The alternatives assessment was based on a rating methodology which included a review of technical, environmental, institutional, and economic factors. These factors were reviewed as to whether the wastewater management alternatives were well suited or not well suited for the individual "needs area".

The results of the alternatives analysis was a shortlist of wastewater management alternatives for each area. The shortlisted alternatives were comprised of alternatives for conventional, on-site Title 5 systems with a septage management plan, I/A Title 5 systems, decentralized systems and regional treatment. These alternatives were further evaluated in Phase III of the CWMP.

Phase III of the CWMP, Detailed Evaluation of Alternatives and Recommendation of Wastewater Management Plan, was completed in Spring 2008 and was submitted to the Town, MassDEP and Massachusetts Environmental Policy Act (MEPA) office on March 31, 2008. The Town did not update the Phase III report in 2016. Phase III further evaluated each Needs Area and evaluated the shortlisted alternatives for each. Phase III also assessed environmental impacts, design criteria, and economic factors associated with each shortlisted alternative. The results of Phase III included near and long-term solutions for wastewater collection, treatment and effluent disposal in each Needs Area.

The Phase III report included a refinement of the Needs Areas, review of the environmental and cost impacts for each viable alternative, and develops a schematic layout and cost estimate for each alternative.

The Phase III report was filed with MEPA and the Town received a certificate in May 2008 which required the completion of a Draft Environmental Impact Report (DEIR). A copy of the certificate is included in Appendix C. The requirement for the DEIR includes several tasks associated with potential impacts to the Lake Shirley and Hickory Hills Lake areas. Response to comments on the certificate and comment letters received by State agencies, Lunenburg citizens and Lunenburg Land Boards are included in Appendix D.

The Town decided to create Priority and Secondary Needs Areas. The Priority Needs Areas include Area 4 - Lower Massachusetts Avenue, Area 6 - Baker Station, Area 9 - Lake Whalom, Area 10 - Massachusetts Avenue/Beal Street, Area 12 - Highland Street, Area 15 - Rolling Acres Road, and GMD 25 - Pioneer Drive. These areas are included in the final recommendations and the implementation plan. The Secondary Needs Areas include the areas for Lake Shirley and Hickory Hills Lake. The Secondary areas will not be included in the implementation plan and are recommended for further study.

The Phase IV report includes a final recommended plan based on the three previous phases and considers/incorporates (as appropriate) feedback from State agencies, Lunenburg residents and Lunenburg Land Boards, including the Sewer Commission, Board of Health, Planning Board and Zoning Board of Appeals. This Phase IV report was updated in 2016 and only included feedback from the Town's Sewer Commission.

1.3 STAKEHOLDERS

Involvement of the citizens and interested stakeholders of Lunenburg is an important component in developing a CWMP. Wright-Pierce assisted the Town with coordinating the involvement of the many stakeholders. The Project Stakeholders include the citizens of Lunenburg, the Lunenburg Board of Selectmen, Sewer Commission, Board of Health, Conservation Commission, Planning Board, Water District, Zoning Board of Appeals, Department of Public Works (DPW), Lake Shirley Improvement Corporation (LSIC), Hickory Hills Lake Association, MassDEP, Department of Fish and Wildlife (DFW), Natural Heritage Program, Water Resources Commission (WRC), the Executive Office of Environmental and Energy Affairs (EOEEA), Massachusetts Environmental Policy Act (MEPA) Office, the Nashua River Watershed Association (NRWA), Montachusett Regional Planning Commission (MRPC) and officials from neighboring communities. Input from many of these stakeholders was solicited and considered in the development of the CWMP. Many of the stakeholders have been actively involved in aspects of Phase IV and previous CWMP phases through monthly Land Board workshops, telephone conversations, special meetings, board meetings and public meetings.

The above stakeholders were not involved in the 2016 update process, except for the Lunenburg Sewer Commission.

SECTION 2

REFINEMENT OF NEEDS AREAS AND ESTIMATED WASTEWATER FLOWS

The Phase I CWMP identified areas with need for further study. These are areas which may need wastewater management beyond a conventional on-site system. The areas of "need for further study" identified for possible off-site solutions have been refined throughout the CWMP process to best define the most appropriate areas for off-site wastewater management.

The evaluative factors utilized in this "refinement" include the layers identified in the Phase I - Needs Analysis and include:

- Title 5 System Inspections;
- Soils/Drainage Class;
- Depth to Bedrock;
- Lot Sizes;
- Water Supply Protection;
- Depth to Groundwater;
- Lunenburg Water Resource Protection District;
- Areas with Regulated Setbacks (Distance to Surface Water, wetlands, etc.);
- Floodplains;
- Areas of Critical Environmental Concern (ACEC);
- Priority/Estimated Habitat Areas; and
- Historic District.

Several sources were utilized in developing the evaluative factors including the Board of Health database, MassGIS and Soil Conservation Service. Other factors that were used in the analysis included BOH hardcopy files from selected systems within each area, a visual analysis of specific areas within town and the potential for further development and growth management. The BOH files were reviewed for property percolation rate, ground slope, system age, and depth to groundwater at the time of inspection. The BOH files were also used to identify area trends. In addition, the Assessor's database provided age of properties. This information identified area trends for the age of systems. The future uses in these areas were also considered and some areas include important recreational resources and others are included in the Town's growth management district.

For several Needs Areas, individual parcels have been identified for potential off-site treatment. The remaining areas of Town are recommended for a Septage Management Plan (SMP). In addition, the SMP is recommended for areas proposed for long-term on-site wastewater disposal as well as those areas proposed for future "off-site" infrastructure until such time as the recommended "off-site" infrastructure plan is implemented in such areas. The sustainability of on-site wastewater disposal systems is dependent on proper operation and maintenance in order to prevent adverse health and environmental impacts. It is the intent of a SMP to operate in

conjunction with the Town's existing municipal wastewater collection systems in the proper collection and disposal of septage. It is recommended that the Sewer Commission and Department of Public Works (DPW) work in conjunction with the Board of Health in order to develop the regulations to manage and oversee the SMP. A decision can then be made regarding the process to administer the institutional requirements set forth in the final approved SMP.

The following provides a brief description of each Needs Area (summarized from previous CWMP phases) and references the figures which define the refined Needs Areas boundaries.

2.1 AREA 4 - LOWER MASSACHUSETTS AVENUE

This area was found to have moderately well drained soils and high groundwater levels. This area is zoned as Residence A (Lunenburg residential zoning definition). This area is generally comprised of smaller parcels with older homes (circa 1950's - 1960's) with some mounded systems. There are ledge outcroppings and land parcels that slope steeply back to wetlands areas. This area is adjacent to larger, undeveloped and unprotected land parcels.

According to the BOH database, there have been several Title 5 variances and failures in this area. Some failures have resulted in variances for groundwater offset, leachfield area, failed perc tests, bedrock offset, and lack of area due to small parcel size. Many of the variances were granted due to limited septic design possibilities. In general, groundwater was observed at depths of 3 feet, although some areas reported groundwater at approximately 5 feet below grade.

2.2 AREA 6 - BAKER STATION

This area is comprised of dense, built-out neighborhoods which show "need", but also include larger, undeveloped and unprotected parcels. This area is zoned primarily as Residence A. This area was found to have high groundwater levels and moderately well drained soils with some portions of poorly drained soils. It was observed that portions of this area have smaller parcels with older homes (circa 1950's - 1960's), steep slopes, forested yards, streams and wetlands. The sections of need are the small parcels along the existing roadways.

There have been several Title 5 failures in this area, according to the BOH database. Some failures resulted in variances for groundwater offset, leachfield area, and failed perc tests. Many of the variances were granted due to limited septic design possibilities. In general, groundwater was observed at varied depths from 1.5 to 12 feet below grade. Perc tests varied from 2 to 40 miles per inch (mpi). The varied soil and groundwater conditions allow some areas to support on-site wastewater disposal systems, while other areas show additional needs.

2.3 AREA 9 - LAKE WHALOM

This area has some dense development with small parcels, but also includes several larger, undeveloped and unprotected parcels. This area is zoned as Residence A. The soils in this area are of varied drainage qualities. Sections of this area were observed to have significantly

mounded systems, high groundwater, and very steep slopes. It was also noted that this area has a number of older homes (circa 1960s - 1970s), wetlands, and built-out neighborhoods.

According to the BOH database, there have been several Title 5 failures in this area. Some of the failures resulted in variances for groundwater offset and mounded systems. In general, groundwater was observed at depths from 2 to 3.5 feet below grade. Perc tests varied from 2 to 40 mpi.

There are several parcels with on-site issues making new systems expensive and in need of a variance. The wastewater management alternative must account for this area being the drainage sub-basin for Lake Whalom, which is an important recreational surface water body for this region.

2.4 AREA 10 - MASSACHUSETTS AVENUE/BEAL STREET

This area has steep slopes, small parcels, and wetlands. According to the BOH database, there have been several Title 5 failures in this area. Several failures resulted in variances for groundwater offset and use of I/A systems. In general, groundwater was observed at depths of approximately 2 feet below grade.

The area has several parcels with poor site conditions for on-site wastewater disposal. The final recommendation should take into account the possibility of providing additional wastewater management in this area to promote/support commercial and industrial development.

2.5 AREA 12 - HIGHLAND STREET

This area has soils which are of varied drainage qualities with areas of very poorly drained soils. Sections of this area have wetlands and high groundwater. In general, groundwater was observed at depths of approximately 2 feet below grade. Perc tests varied from 6 to 30 mpi.

2.6 AREA 14 - HICKORY HILLS LAKE

The parcels in Area 14 are small and there are no large, undeveloped and unprotected parcels in the area. This area is primarily built-out. In addition, several mounded systems were observed. Area 14 is adjacent to the Squannassit Area of Critical Environmental Concern and is a NHESP priority and estimated habitat area (on the eastern side of the lake). This area was determined to be a Needs Area based on soil, high groundwater and sensitive receptors and ecosystems.
According to the BOH database, there have been several Title 5 failures in this area. Some failures resulted in variances for groundwater offset, on-site wastewater disposal system area, failed perc test, bedrock offset, and lack of area due to small parcel size. Many of the variances were granted due to limited septic design possibilities. In general, groundwater was observed at depths to 3 feet, although some areas reported groundwater at approximately 9 feet below grade. Perc tests varied from 2 to 38 mpi.

The recommended management alternative needs to mitigate impacts to surface waters since this is the drainage sub-basin for Hickory Hills Lake, which is an important recreational surface water body for the region. A large portion of this area is built-out, but portions are adjacent to developable parcels. In addition, the recommended management alternative should take into account that this area is within the Mulpus sub-basin which is a medium stressed sub-basin of the Nashua River watershed.

2.7 AREA 15 - ROLLING ACRES ROAD

The soils in this area are moderately well drained and the groundwater levels are high. Small parcels, severe slopes, and wetlands were observed during the visual analysis. There were a few Title 5 failures in this area, according to the BOH database. Some failures resulted in variances for groundwater offset and mounded systems. In general, groundwater was observed at depths between 2.5 and 4 feet below grade.

2.8 AREA 19 - LAKE SHIRLEY

This area is comprised of Residence A, Residence B, and Commercial zoning districts. The area also includes an industrial manufacturer of construction earth products (PJ Keating), a campground, and a public beach. There are areas with severely steep slopes and the soils are extremely well drained.

The parcels adjacent to the lake are small and primarily built-out. The homes at one time were primarily summer residences, but many have converted to year-round residences.

According to the BOH database, there have been several Title 5 failures in this area. Some failures resulted in variances for groundwater offset, distance to wetlands, distance to surface water, and distance to drinking water wells. Many of the variances were granted due to limited septic design possibilities. The surface water in this area is known for having elevated nutrient levels. Groundwater was observed at depths between 1 and 12 feet below grade. In general, perc tests in the area were 2 mpi.

This area has varied needs due to several factors including fast perc-ing soils, growth management concerns, and nutrient loading. There are several parcels with on-site issues in the area making new systems expensive and in need of a variance. The recommended alternative needs to take into account that this area is a portion of the drainage sub-basin for Lake Shirley, which is an important recreational surface water body for this region. Lake Shirley is a nutrient sensitive area which has an elevated level of phosphorus.

2.9 AREA 25 - PIONEER DRIVE GROWTH MANAGEMENT DISTRICT (GMD)

This area is included in the Town's Growth Management District for commercial and industrial development. The area is zoned as Office Park/Industrial. The Town is considering encouragement of commercial and industrial development in this area. The Planning Board continues to review this area for growth potential in regards to commercial and industrial

development. The recommended management alternative for this area must "manage" flows large enough to attract commercial and industrial development and should be able to meet the requirements to treat industrial wastewater.

2.10 WASTEWATER FLOWS

Wastewater flows were estimated for existing and future residential sanitary sources, existing and future commercial and industrial sources, and existing and future I/I flows. Total future flows were calculated for the existing sewered areas and each Needs Area. The flows were based on the theoretical growth in year 2036 for the existing sewered areas and Needs Areas. Sanitary, commercial and industrial flows are based on the parcels defined in the Lunenburg Assessor's database.

2.10.1 Existing Flows

The existing wastewater flows were estimated using data from the Town, as well as the Metcalf & Eddy Wastewater Engineering textbook 4th edition, TR16, and the Massachusetts Environmental Code (Title 5). Flows from residential properties were estimated by the number of bedrooms for each parcel, according to the Lunenburg Assessor's database. For residential sanitary unit flows, it was determined that the State Environmental Code is overly conservative (110 gallons per day per bedroom (gpd/bedroom)). In fact, this unit flow is approximately twice the actual unit rate of water usage for the Lunenburg Water District (LWD) (which is typical of most communities). As such, the estimated flow generation was reduced to reflect the LWD actual usage of 170 gpd for a residential service. According to the Assessor’s database, the average residential home in Lunenburg is 3 bedrooms. Therefore, the residential sanitary flows were estimated based on a generation rate of 57 gpd/bedroom. Estimating flow on a “per bedroom” basis instead of a “per capita” basis allows estimates to be specific to each parcel (listed in the Town Assessor’s database) instead of using the same average household size, and therefore the same sanitary wastewater generation rate, for every residential parcel in the Town. (using the average household size in Lunenburg of approximately 2.6 people per household, the 57 gpd/bedroom rate corresponds to a per capita flow rate of 64 gpd/person, which is within the expected range of industry standards). Wastewater generation for the public schools was based on actual annual average water usage at each school.

For non-residential flows (commercial and industrial flows for example), water usage data for individual parcels was unavailable, so the wastewater generation rate (unit flow) was estimated based on the use of the parcel. The State Environmental Code, Metcalf & Eddy, and experience with similar generation rates in other similar Massachusetts municipalities were used to determine the generation rate. Table 2-1 shows the wastewater generation rates used to determine sanitary flows from different types of non-residential properties included in the Assessor's database.

TABLE 2-1
NON-RESIDENTIAL WASTEWATER FLOW RATES

ZONE	WASTEWATER GENERATION RATE
Commercial (C)	75 gpd/1000 SF
Industrial (I)	100 gpd/1000 SF
Limited Business (LB)	75 gpd/1000 SF
Office Industrial (OI)	75 gpd/1000 SF
Office Park (OP)	50 gpd/1000 SF

The building area (in SF) of each of the non-residential parcels and the wastewater generation rates were used to determine the total flow for each parcel.

2.10.2 Residential and Non-Residential Sanitary Flows from Existing Infrastructure

The total existing sanitary flow (residential and non-residential) to Fitchburg was estimated to be approximately 44,200 gpd based on the above methodology. Recent wastewater flow meter data was shown to be slightly less than the above estimation, so the more conservative calculation will be used for projecting flows.

The existing sanitary flow to Leominster was taken from recent wastewater flow meter data, which was higher than the original estimation of 58,700 gpd. The average daily flow to Leominster based on this data is approximately 170,000 gpd.

2.10.3 I/I Estimates for Existing Collection System

The estimated I/I flows are based on the quantity of gravity sewer pipe using an assumed I/I rate of 300 gpd/inch-diameter-mile (TR16 range for new pipe is 250-500 gpd/inch-diameter-mile) for the 20-year planning period. I/I rates are not applied to sewer force mains or low pressure systems.

The Town currently reports flow conveyed to Leominster and Fitchburg based on wastewater flow meter readings. However, the actual amount of I/I entering the system is unknown and must be estimated. In general, the amount of I/I entering a wastewater collection system is highly variable, and dependent on many factors, including the age of the system, type of pipe used in the system, depth to groundwater, and the existence of any direct or indirect connections to the wastewater collection system (such as storm drain piping). In order to estimate the amount of I/I flows in the existing collection system, the total length of pipe was obtained by examining the as-built plans for the construction of the existing collection system.

Separate I/I assessment studies have been performed to date, and the Town continues to perform work to reduce the amount of I/I entering their collection system During one of the I/I studies,

an engineering firm conduct a short-term flow monitoring program in the spring 2011. The estimated flow of infiltration was 29,000 gpd, which was equivalent to approximately 220 gpd/inch-diameter-miles (idm). According to DEP Guidles for Permforming I/I Analysis, subareas exhibiting an infiltration rate equal to or greater than 4,000 gpd/idm are considered excessive. Using this benchmark, none of the subareas in the Town had excessive infiltration.

The estimated flow of peak inflow was 1,225,000 gpd, which was equivalent to approximately 9,400 gpd/inch-diameter-miles (idm). According to DEP Guidles for Permforming I/I Analysis, subareas exhibiting an inflow rate equal to or greater than 4,000 gpd/idm are considered excessive. Using this benchmark, five of the six areas had excessive inflow.

When I/I studies have not been performed, a typical estimated amount of I/I flow is 300 gpd/idm for a "design year".

It is worth restating that these I/I flow totals are only estimates, It is prudent to consider the possibility of such I/I flows in wastewater planning. Because I/I rates are variable, it is recommended that Lunenburg gather more information regarding the actual amount of flow in its system.

2.11 FORECAST OF 2036 FLOWS

Analysis of the wastewater flows discussed in previous sections examined the wastewater flows for the existing infrastructure. The original Phase IV report used 2006 as the current year and 2026 as the future year. This update to the Phase IV report used 2016 as the current year and 2036 as the future year. The following section details the flow estimates for the future (2036) wastewater flows.

2.11.1 Future Wastewater Flows

To estimate future wastewater flows, population growth projections for the Town were evaluated to estimate how the characteristics of the Town could change over time. The long-term impacts of growth and development were analyzed by looking at a baseline of build out flows for the Town. The baseline build out is calculated by examining land area and zoning requirements to determine the amount of growth which could theoretically occur in Lunenburg over a long period of time.

Preliminary review of the EOEA estimates indicates that by the time the Town reaches theoretical build out, the population of Lunenburg is expected to more than double as compared to the 2000 census, and the water use increased by a factor of almost five as compared to 2000 water use. It is unrealistic to expect that growth on such a scale could occur within the 20-year planning period of the CWMP (2016 - 2036).

2.11.1.1 Year 2036 Flows

To calculate the future wastewater flows for the end of the study period (year 2036), the population increase in the Town was estimated for the 20-year planning period. The projected

population from the University of Massachusetts Donahue Institute study in Year 2035 is expected to be 10,642. This equates a 20-year growth rate of 5 percent over the 2015 estimated population. This UMass Donahue Institute study growth rate was also used as a baseline to estimate the projected population growth between 2016 and 2036. Lunenburg has seen an increase in the number of proposed residential units, which has largely been concentrated in the existing sewered areas. It is reasonable to assume that this trend will continue in the future. Furthermore, it accounts for the possibility of additional 40B development (beyond those projects already presented to the Planning Board) in the existing sewered area. Given the proximity of the existing sewered areas to transportation and commercial districts, it is assumed that the majority of future large scale developments like 40B projects (or additional town-approved 40R projects) will occur in the existing sewered area. Therefore, it is projected that wastewater generation from currently connected properties will increase by 10 percent, or double the baseline growth rate projected by the UMass Donahue Institute study(5%). Furthermore, it is estimated that only 10 percent of the potential development will occur by 2036. This value is an estimate to account for the additional growth possible as a result of the presence of an existing wastewater collection system.

2.11.2 Estimated 2036 Residential Sanitary Flows

The estimated 2036 residential sanitary flows were estimated based on three development scenarios. The scenarios that were considered are as follows:

1. Currently sewered parcels that are further expanded;
2. Currently non-sewered parcels that can be connected; and
3. Currently undeveloped parcels that are/can be connected (in the 'sewered area'/'non-sewered area').

The amount of potential residential sanitary wastewater flow was calculated based on the following methodology (the methodology was the same for each scenario, described above): The area of the parcel (in acres) was divided by the minimum lot size required by zoning requirements shown in Table 2-2. A "utilization factor" of 84 percent to account for odd-shaped parcels, driveways, wetlands, steep slopes, setbacks, for example, was then applied, which yields the number of potential parcels with the appropriate minimum lot size. If the property had an existing residential unit, the potential number of parcels was decreased by one (there were no adjustments made to undeveloped properties, i.e. Scenario 3 above). If the resulting number of potential parcels was greater than two, it was rounded to the nearest whole number. The potential parcels were assumed to have an average size of 3.5 bedrooms per parcel. This is slightly higher than the existing average household of just over 3 bedrooms per parcel, to reflect development trends towards larger homes. Therefore, each parcel was assigned 3.5 bedrooms per parcel and a unit flow of 57 gpd/bedroom. Finally, it was assumed that only 10 percent of this potential development would occur by 2036.

TABLE 2-2
ZONING REQUIREMENTS

ZONE	MINIMUM LOT SIZE
Commercial (C) [1]	10,000 SF
Industrial (I) [1]	10,000 SF
Limited Business (LB) [1]	10,000 SF
Office Industrial (OI) [1]	10,000 SF
Office Park (OP) [1]	10,000 SF
Residence A (RA)	40,000 SF
Residence B (RB)	80,000 SF
Residence 1 (R1) [2]	40,000 SF
Outlying (O)	80,000 SF

Notes:
1. Dependent on the protective bylaw
2. Assumed to be the same as Residence A

2.11.3 Potential Flows from New and Proposed Developments

In addition to the residential wastewater flows estimated for 2036, there are several large development projects, which have recently been completed or are planned for construction. Estimated flows for these developments are included in the total estimated flows for 2036. Table 2-3 details these developments and their estimated flows. The original list of developments in the Phase IV CWMP has been updated to the development list in 2016.

It should be recognized that a number of factors make further development in the sewered areas possible. One such factor is the simple presence of existing sewers. Sewers may allow larger scale, more dense development, due to the fact that wastewater does not need to be disposed of on-site. Another factor which encourages development in Lunenburg's existing sewered areas is the transportation access. These areas have close proximity to highways such as Route 2, as well

TABLE 2-3
NEW AND FUTURE DEVELOPMENTS

Project Name	Location	Home Type	# Units	# of Over 55 Units	Project Status	Expected Date Online	Assumed Bedrooms per Unit	Estimated Flow (57 gpd/bedroom)	Area #
Standard Subdivisions									
274 Prospect St	274 Prospect		18		in review		3	3,078	9
Aro Estates	318 Howard St				In Litigation				N/A -not public sewer
Benjamin Hill	69 Mass Ave	single family	2		dormant		3	342	4
Emerald Place At Lake Whalom	10 Lakefront	town house & garden-style (1 & 2 bdrm)	239	38	211 of 239 units complete - no target date per EP (or Building Dept) for remaining 28 units as of 2/24/16		2	24,054	Included in Existing Sewered Area to Leominster
Emerald Place-commercial development		opposite Electric Ave			will be developed commercially -currently vacant land				Included in Existing Sewered Area to Leominster
Highfield Village	361 Mass Ave	single family	66		in review	3 phases(min) -10 years	3	21,780	Area 10
Lena Lane	Lancaster Ave/Gibson St	single family	4		in construction		3	684	N/A -not public sewer
Oak Ave homes(Ashoryn LLC)	175 Northfield Rd	single family	9 (5 to be sewered)		in construction	1st house in construction/all lots cleared	3	855	12
Oak Haven Estates	Arbor St	single family	6		dormant		3	1,026	N/A -not public sewer
Sequoia Drive	341 Howard St	single family	8		complete		3	1,368	N/A -not public sewer
Stone Farm Estates	748 Mass Ave	condo-type	58	5	58 total - 5 still under construction		2	6,042	Included in Existing Sewered Area to Leominster
Villages at Flat Hill	Flat Hill Rd	single family	45		structures completed/ road mitigation incomplete		3	7,695	N/A -not public sewer
Whispering Pines	Beal Street	single family	19		never filed for definitive		3	3,249	Area 10
White Tail Crossing	209 & 331 Burrage St	single family	16		complete		3	2,736	N/A -not public sewer
40B Projects									
Lunenburg Estates	1229 Mass Ave	town houses	64		Approved (construction period not known)		2	7,296	Included in Existing Sewered Area to Leominster
Hollis Hills	Hollis Rd &t West St	condo-type (3-brm)	146		In Litigation		3	24,966	Assumed not sewered
Whalom Luxury Apts(prev Lunenburg Village)	250 Whalom Rd	garden-style apartments	15		15 1 BR UNITS, 105 2BR - Approved - 5 BUILDINGS		1	12,825	Included in Existing Sewered Area to Leominster
Others									
Project Name	**Location**	**Home Type**			**Project Status**	**Expected Date Online**	**Assumed Building Footprint (sf)**	**Estimated Flow (gpd)**	**Area #**
270 Electric	270 Electric	self-storage units			approved		1,500	113	Included in Existing Sewered Area to Leominster
339 Electric	339 Electric	Automotive shop			proposed		4,000	400	Included in Existing Sewered Area to Leominster
357 Electric	357 Electric	Unitil headquarters			in review		20,300	1,523	Included in Existing Sewered Area to Leominster
Lunenburg High School	1079 Mass Ave	New High school			in construction		0	0	replaces existing high school
835 Leominster Rd (Kevin Hill)	835 Leominster Rd	single family			taken out of consideration (2/16)				N/A -not public sewer
Total									
								121,000	

as access to the MBTA Commuter Rail. Therefore, it is possible that future growth may be concentrated in the sewered areas of Lunenburg.

2.11.4 Estimated 2036 Non-Residential Sanitary Flows

The same three scenarios as discussed in the previous section were used to determine the 2036 non-residential sanitary flows. The amount of potential non-residential sanitary wastewater flow was calculated based on the following methodology (the methodology was the same for each scenario): The area of the parcel (in acres) was multiplied by a "utilization factor" of 84 percent to account for odd-shaped parcels, driveways, wetlands, setbacks and steep slopes. This area was then multiplied by a "usable building" factor of 60 percent to account for the portion of the parcel which would be usable building space. Finally, the appropriate wastewater generation rate was assigned to the area based on the current zoning of the parcel (and it was assumed that only 10 percent of this potential development would occur by 2036).

It should be noted that the projected increased flows do not include any flows from “change of use” for individual parcels of land. For example, if an existing single-family home were to be subdivided into several parcels, or changed to a different use, the increase in flows could be even higher. Even within existing commercial zones, there is the possibility of increased flow from the same parcel if the type of business changes. For example, a 4,000 square foot office building would generate 300 gpd of sanitary wastewater flow, according to Title 5. If that same 4,000 square foot building were converted to a 100-seat restaurant, the sanitary flow generated would increase to 3,500 gpd. Furthermore, if the building were converted to a Laundromat with 25 washing machines, the flow would increase to 10,000 gpd. It is difficult to predict where these types of “change of use” may occur. Therefore, it should be noted that the possibility exists that the future flow from existing "bettered" parcels could be even larger than the flow predicted.

Table 2-4 summarizes the 2016 and 2036 flows, for areas with existing infrastructure flows to Leominster and Fitchburg**.** It is important for the Town to determine which developed properties within the existing Sewer System Service Area have paid a betterment for sewer, but have not yet connected to Town sewer. The Town will need to continue to keep in reserve available flow capacity for these parcels to connect to the sewer. We have included these units in our flow estimates.

TABLE 2-4
FLOWS FROM EXISTING SEWER SERVICE AREAS
2016 AND 2036

	EXISTING FLOW (2016) GPD	FUTURE FLOW (2036) GPD
Fitchburg		
Existing Sewered Flow[1]	44,200	48,620
Non-Residential Flow	-	65,000
Residential Flow	-	2,500
New & Proposed Developments	-	-
Total to Fitchburg	**44,200**	**116,120**
Leominster		
Existing Sewered Flow[1]	170,000	187,000
Non-Residential Flow	-	52,600
Residential Flow	-	39,200
New & Proposed Developments	-	25,900
Total to Leominster	**170,000**	**304,700**

1. Taken from existing flow meter data, which includes I/I flow.

2.12 FLOW ESTIMATES IN NEEDS AREAS

To estimate the amount of wastewater generated in each of the new Needs Areas, GIS software was used to group the existing parcels of land in the Assessor's database by Needs Area. Other data imported from the Assessor's database included the zoning for the parcel, the number of bedrooms (if the parcel currently has a residential unit on it), the building square-footage (if the parcel is currently developed), and the total acreage for the parcel. With this data the amount of sanitary wastewater generated under theoretical build out was estimated. The rationale for the estimates for each type of parcel is discussed below.

2.12.1 Theoretical 2036 Growth in Residential Zoned Areas

As previously discussed in this Section, the existing residential properties in Lunenburg average 57 gallons of water usage per bedroom per day. This rate was also applied to the existing residential properties in the Needs Areas of the Town, to determine the amount of wastewater currently generated in each Needs Area.

To determine potential flows, it was assumed for each parcel in the Needs Area, the maximum amount of homes allowed under existing acreage requirements would be built on the parcel, including parcels with existing residential units. For a single property in a Needs Area with specific zoning, the existing parcel acreage was divided by the appropriate minimum lot size (Table 2-4) for the zoning category and multiplied by the utilization factor of 84 percent. If the

property has an existing residential unit, the potential number of parcels was decreased by one (there were no adjustments made to undeveloped properties). If the resulting number of potential parcels was greater than two, it was rounded to the nearest whole number and counted toward the total potential parcels for that zone in that Needs Area. This was repeated for each residential zoned area in all of the Needs Areas. The properties were assumed to have an average size of 3.5 bedrooms per parcel. This is slightly higher than the existing average household of just over 3 bedrooms per parcel, to reflect development trends towards larger homes. Therefore, each parcel was assigned 3.5 bedrooms per parcel. At 57 gpd/bedroom, the unit flow assigned is 200 gpd per parcel. Finally, the potential flows were calculated by adding the amount of wastewater currently generated in each Needs Area to the amount of wastewater generated at "theoretical build out" in each Needs Area.

Parcels which were identified as State or Town-owned conservation land were omitted from the analysis. The wastewater flow generated at these parcels was assumed to be zero for each scenario. Additionally, parcels with large percentages of wetlands (as identified by MassGIS) were scaled back to account for the fact that wetlands would not be developable.

2.12.2 Theoretical 2036 Growth in Non-Residential Zoned Areas

Although almost 97 percent of the parcels in unsewered areas are currently zoned as residential, there remain some parcels of land which are zoned for commercial, industrial, or office park use which are not served by the existing wastewater collection system. For these parcels, the amount of sanitary wastewater currently generated was estimated as follows: The building area of each of the parcels and the wastewater generation rates (Table 2-1) were used to determine the total flow for each parcel in each Needs Area. The potential flow for each parcel was estimated as follows: For both developed and undeveloped parcels, the area of the parcel was multiplied by a "utilization factor" of 84 percent to account for odd-shaped parcels and requirements for additional roadways within the parcel. This area was then multiplied by a "usable building" factor of 60 percent to account for the portion of the parcel which would be usable building space. Finally, the appropriate wastewater generation rate was assigned to the area based on the zoning of the parcel. Finally, the potential flows were calculated by adding the amount of wastewater currently generated in each Needs Area to the amount of wastewater generated at "theoretical build out" in each Needs Area.

2.12.3 Study Period (2036) Flows

The sanitary flows listed in Table 2-5 were used for planning purposes as the study further evaluates the needs and potential solutions for wastewater management in the last phase of the CWMP. These sanitary flows are “average daily flows”, or the amount of flow expected to be generated, on average, over a period of a month or longer.

TABLE 2-5
PROJECTED YEAR 2036 FLOWS

AREA	EXISTING FLOW, GPD[1]	2036 FLOW FROM EXISTING, GPD[2]	NEEDS AREA FLOW, GPD	NEW & PROPOSED DEVELOPMENTS, GPD	I/I, GPD	BUILD-OUT FLOW, 2036	TOTAL FLOW 2036, GPD
Leominster							
Existing to Leominster	170,000	187,000	-	25,900	- [1]	91,800	305,000
Needs Area 4			21,800	350	5,600	25,500	54,000
Needs Area 6			37,300	-	400	43,200	81,000
Needs Area 9			34,400	3,100	4,400	41,200	84,000
Needs Area 10			13,100	25,000	3,600	29,800	72,000
Needs Area 12			15,900	850	2,700	18,600	39,000
Needs Area 15			14,300	-	2,600	15,700	33,000
GMD 25			11,400	-	4,100	111,200	127,000
TOTAL	170,000	187,000	148,200	55,200	23,400	377,000	795,000
Fitchburg							
Existing to Fitchburg	44,200	48,620	-	-	- [1]	67,500	117,000

[1] Taken from existing flow meter data, which includes flow from I/I.
[2] 10% increase due to population growth.

It is important to note that because of the re-routing from Fitchburg to Leominster in Area 4, there are existing sewered parcels that will now send flow to Leominster. The flows from these parcels will be a reduction in 23,600 gpd from Fitchburg that will discharge to Leominster instead in 2036. This number is derived from Commercial lots estimated at 18,000 gpd and 5,600 gpd from Residential areas. This means that 93,400 gpd are estimated to flow to Fitchburg and 818,600 gpd are estimated to flow to Leominster in 2036.

SECTION 3

WASTEWATER MANAGEMENT CONSIDERATIONS

The wastewater management plan was revised and updated with each phase of the CWMP process. The Phase III report included a preliminary recommended plan. The Phase III preliminary recommended plan was utilized to develop the final recommended plan included in the original Phase IV report. The recommended plan also was updated in this 2016 Phase IV report. The final recommended plan was modified based on feedback from many entities, but primarily the Sewer Commission, Board of Health, and Planning Board.

Key revisions to the recommended plan in 2010 included:

- The Needs Areas to match the proposed Sewer Service Area Zones;
- A revised IMA agreement with the city of Fitchburg and city of Leominster;
- The collection systems recommendations to remove the growth management provisions;
- Removing Hickory Hills Lake and Lake Shirley from the implementation plan and recommending these Areas further study.

Key revisions to the recommended plan from the 2016 update included:

- Re-routing Needs Area 4 to discharge flow to Leominster;
- Re-routing Needs Area 10F to discharge flow to Leominster; and
- Reflect work done over the last year in Needs Areas 6 and 9.

3.1 REFINED NEEDS AREAS

The Needs Areas were refined and are included in Section 2.0. The revisions are based on information provided by the Lunenburg Sewer Commission including the new Sewer Service Zones. The recommended plan includes an implementation plan for the revised Needs Areas projects.

3.2 AMENDMENTS TO EXISTING INTERMUNICIPAL AGREEMENTS

Phase III included a recommendation to revise the existing Intermunicipal Agreements (IMA) with Fitchburg and Leominster. The Town previously was in communications with the city of Leominster regarding additional wastewater capacity. The Town has decided to revise the proposed collection system layout and routing, which will increase flows to Leominster (not implement a limited infrastructure collection system). Recommendations for the revised IMA to Leominster are included in the recommended plan. The Town has entered into a new IMA with Fitchburg, effective on December 15, 2013, which allows 151,000 gpd to be discharged along Route 2A and 10,000 gpd along Summer Street. The new IMA was negotiated based on recommendations for flow capacity in the original Phase IV CWMP.

3.3 COLLECTION SYSTEM RECOMMENDATIONS

The collection system recommendations were assessed based on technical, economic, operation and maintenance factors. The collection system alternatives included in the recommended plan are conventional sewers (including gravity mains, force mains, and pump stations) and low pressure sewers (with individual grinder pump stations).

Conventional gravity collection systems are prevalent throughout New England due to their ease of long-term maintenance and simplicity. They require the lowest energy usage of the collection system alternatives and can handle power outages with mandatory backup power generators installed at each pump station. These systems are typically sized with excess working capacity to allow for future connections.

Low pressure sewer systems have the potential for lower capital cost; and are easier to construct due to shallower and narrower excavations. This also reduces the environmental impact and duration of construction. These systems are better suited for challenging terrain, crossings of streams, roads, railroads, and narrow streets. Low pressure sewers can also be used to manage growth. Sprawl or expansive growth outside of identified Needs Areas as well as limited "infill building" can be reduced with low pressure sewers. There will be some potential for future connections, but these systems are generally physically limiting in capacity (due to the smaller piping size).

3.3.1 Collection System Considerations

The Phase III preliminary plan included recommendations to maximize the amount of low pressure sewers utilized for the Needs Areas. This preliminary recommendation limited the physical capacity of the system. The recommendation assumed beneficial impact to limit unwanted secondary growth, and would minimize impacts to the IMAs with Leominster and Fitchburg. The Town decided that maximizing low pressure sewers to limit growth was too "limiting" and determined to utilize conventional and low pressure sewers only as dictated by best engineering judgment based on the specifics of each Needs Area.

3.4 RECOMMENDATIONS FOR AREA 14 - HICKORY HILLS LAKE AND AREA 19 - LAKE SHIRLEY

The Phase III report was filed with MEPA (Notice-of-Project Change) and the Town received a certificate in May 2008 which requires the completion of a Draft Environmental Impact Report (DEIR). The requirement for the DEIR included several tasks associated with potential impacts to the Lakes regions. Accordingly, the Town decided to create Priority and Secondary Needs Areas. The Priority Needs Areas include Area 4 - Lower Massachusetts Avenue, Area 6 - Baker Station, Area 9 - Lake Whalom, Area 10 - Massachusetts Avenue/Beal Street, Area 12 - Highland Street, Area 15 - Rolling Acres Road and GMD 25 - Pioneer Drive. These areas will be included in the final recommendations and the implementation plan. The Secondary Needs Areas include the areas for Lake Shirley and Hickory Hills Lake. The Secondary Areas are not included in the implementation plan and are recommended for "further study".

The alternatives detailed in the Phase III report for Area 14 - Hickory Hills Lake and Area 19 - Lake Shirley should be further investigated as part of continued wastewater management planning for these areas. Maintaining the local water balance in both lakes areas is an important factor in "future study".

These areas were identified through the needs analysis as areas which are not well suited by the current Title 5 regulations for on-site disposal. On-site Title 5 wastewater disposal systems are the existing prevalent method of management for residential properties in these areas. On-site wastewater disposal systems collect, treat, and dispose of wastewater typically from an individual dwelling into the ground within the boundaries of the property. There are two main categories of Title 5 on-site systems: Conventional (Traditional); and Innovative and Alternative (I/A). The two lakes areas may require off-site or a combination of enhanced on-site and off-site wastewater treatment and disposal.

These areas were identified for several reasons including small lots, poor soils, and high groundwater. These areas have also had issues with replacement of on-site systems (for the previously stated reasons). The current Title 5 regulations have specific requirements for a conventional onsite wastewater disposal system and also allows for Innovative/Alternative systems. The current Title 5 regulations have specific requirements for site conditions, soils, and setbacks which these areas may not be able to provide, hence, an alternative wastewater system may be recommended. As such, several wastewater treatment, collection and disposal alternatives were reviewed for these areas.

The alternatives for "further study" for these two areas are recommended in addition to the current Title 5 regulations. The alternatives include Conventional Title 5 systems with a Septage Management Plan, Innovative/Alternative Systems, Decentralized Systems and Regional Treatment. These alternatives are further described in the following sections.

3.4.1 On-Site System Alternatives

3.4.1.1 Conventional Title 5 systems with a Restrictive Septage Management Plan

The wastewater management alternative for conventional on-site systems includes a septage management program (with restrictions), in addition to Title 5, to be managed by the Town (typically the Board of Health). A restrictive septage management plan, including additional siting requirements, required maintenance and public education could allow for sustainability for areas not well suited for onsite systems and also provide support for areas proposed for future sewer system extensions. The recommendations for a septage management plan include requiring existing systems to be pumped and inspected at regular intervals, and perhaps upgraded with I/A technologies. The recommendations also include provisions for funding mechanisms, such as requiring septage haulers to have a permit and pay a fee to an escrow account for each pump out. This allows the Board of Health to support the septage management plan, including development of a database of information on the systems (and pumping), verifying inspections, and associated testing.

3.4.1.2 Innovative/Alternative (I/A) Systems

The wastewater management alternative for I/A systems includes recommendations for bylaw changes, including additional siting requirements in the BOH regulations. The bylaw changes would provide more situations where I/A system installations would be necessary. In addition, the recommendations include bylaw changes to require I/A systems in environmentally sensitive areas. This alternative would provide a mechanism for requiring additional nutrient treatment in areas proximate to surface waters.

3.4.2 Off-Site System Alternatives

An off-site wastewater system collects, treats, and discharges wastewater from an individual property to a location beyond the boundaries of the property. Off-site solutions include decentralized and regional wastewater management alternatives. Lunenburg currently has two private decentralized facilities in Town (Village at Flat Hills and Woodland Village) and also utilizes a regional system for off-site treatment and disposal at the existing Leominster and Fitchburg treatment facilities.

3.4.2.1 Decentralized Systems

The decentralized system alternatives include a local collection system, small package type treatment facility and effluent disposal system. Treatment facilities that treat flows less than 10,000 gpd are designed, permitted and constructed under Title 5 regulations. Facilities that treat flows over 10,000 gpd require a DEP Groundwater Discharge Permit (GWDP).

The effluent disposal alternatives must consider potential sites proximate to Needs Areas. For each effluent disposal alternative, sites are preliminarily selected for the construction of a decentralized wastewater treatment facility to determine cost estimates and other impacts. The effluent disposal alternatives include subsurface disposal.

3.4.2.2 Regional Alternatives

The wastewater management alternative for regional treatment includes treatment and effluent disposal at the regional treatment facilities in Shirley/Devens and Leominster.

<u>Shirley/Devens</u>

This regional alternative includes ultimate wastewater disposal at the existing Devens WWTF via the existing Shirley wastewater collection system. This alternative would include successfully implementing Intermunicipal Agreements (IMAs) with both the town of Shirley and Devens (currently managed by MassDevelopment). Discussions with Shirley and Devens to date indicate that this is potentially a politically viable alternative. The intermunicipal agreements would need to include the infrastructure connection to the system within Shirley and any necessary upgrades to existing infrastructure (including sewer, force mains and pump stations). The viable alternative for regional treatment at the Devens WWTF includes Needs Area 19.

Leominster

The regional alternative to Leominster includes treatment at the existing Leominster WWTF. The town of Lunenburg and the city of Leominster have an established IMA for the treatment and effluent disposal of 500,000 gpd. The potential flows from Area 14 and Area 19 could be included in the revised IMA with Leominster.

3.4.3 Treatment Considerations for Area 14 - Hickory Hill Lake and Area 19 - Lake Shirley

As part of the review of the Phase III preliminary recommended plan, the Sewer Commission, Board of Health and Planning Board commented on the wastewater management alternatives for these areas. The comments included suggested revisions to the assumptions for these alternatives. The proposed changes to the preliminary recommendation included:

- Comments from the Board of Health, which do not support required septage tank pumping at this time.
- Comments from the Board of Health and Sewer Commission, which do not support bylaw changes to BOH regulations to make siting requirements under Title 5 more stringent.
- Comments from the Board of Health and Sewer Commission, which do not support requiring I/A systems in environmentally sensitive areas.
- Comments from the Sewer Commission, which do not support the installation of low pressure sewer mains solely to reduce potential secondary growth impacts (low pressure sewers will still be recommended for practical engineering purposes, such as low lying areas, varying elevations, and high groundwater).

For the reasons noted above, the Phase III preliminary recommended plan included a recommendation for decentralized treatment because the Town currently does not plan to support requirements in addition to Title 5. The Phase III plan states that the potential impacts from growth and development should be managed through a defined Sewer Service Area (implemented by the Town in May 2009) and Town development guidelines, such as Zoning regulations, Sewer Use regulations, Planning Board regulations and stormwater management plans.

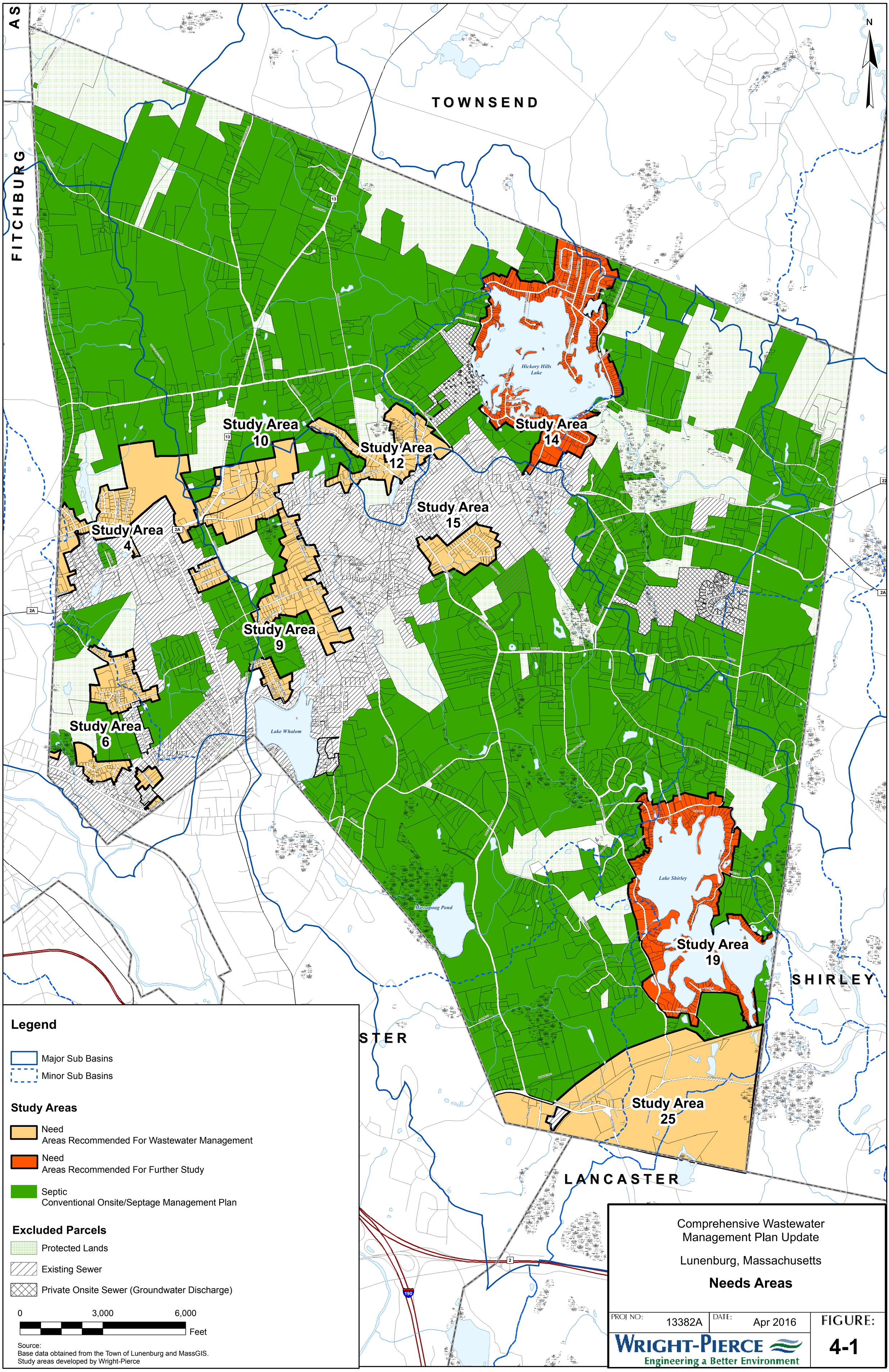
SECTION 4
RECOMMENDED WASTEWATER MANAGEMENT PLAN

The recommended wastewater management plan includes a review of potential environmental impacts, preliminary design criteria, cost estimates and financing analysis, and an implementation schedule. The recommended wastewater management plan was developed by evaluating potential environmental impacts and other factors, then "calibrating" such with an engineering analysis. Several factors were considered and evaluated to provide the most appropriate wastewater management plan in terms of public health, water supply protection, protection of surface waters, and managed growth and community character. It is important to note that economic factors are important criteria, but that they are only part of the process for recommending a wastewater management plan.

The wastewater management plan includes a combination of recommended infrastructure systems and wastewater management techniques. Mitigation measures are included to limit potential impacts from the implementation of the recommended plan. The updated final plan includes specific recommendations for wastewater collection, treatment and disposal for the town of Lunenburg. The general recommendations for each Needs Area (Sewer Service Zone) are included in Figure 4-1.

4.1 RECOMMENDED WASTEWATER MANAGEMENT TECHNIQUES

There are several management techniques included in the recommended plan. Management techniques provide for system limits, rules and regulations, water conservation, recharge, public education and wastewater flow reduction. The techniques are included as a necessary management "layer" to existing and future wastewater collection, treatment and disposal (these "techniques" do not provide additional or different types of collection, treatment or effluent disposal). These recommendations allow for the optimization of Lunenburg's current water system, municipal wastewater collection system and on-site septic systems.


TOWNSEND
FITCHBURG
LANCASTER
SHIRLEY
N
Hickory Hills Lake
Lake Whalom
Massapoag Pond
Lake Shirley
Study Area 4
Study Area 6
Study Area 9
Study Area 10
Study Area 12
Study Area 14
Study Area 15
Study Area 19
Study Area 25
Legend
Major Sub Basins
Minor Sub Basins
Study Areas
Need
Areas Recommended For Wastewater Management
Need
Areas Recommended For Further Study
Septic
Conventional Onsite/Septage Management Plan
Excluded Parcels
Protected Lands
Existing Sewer
Private Onsite Sewer (Groundwater Discharge)
0
3,000
6,000
Feet
Source:
Base data obtained from the Town of Lunenburg and MassGIS.
Study areas developed by Wright-Pierce
Comprehensive Wastewater Management Plan Update
Lunenburg, Massachusetts
Needs Areas
PROJ NO: 13382A
DATE: Apr 2016
FIGURE: 4-1
WRIGHT-PIERCE
Engineering a Better Environment

A primary goal of the CWMP is to identify wastewater management needs in areas that are not well suited for on-site systems. Potential secondary impacts from the recommended plan, such as growth management, are identified and management techniques are included in order to mitigate potential impacts. It is recommended that the Town implement specific management techniques prior to implementing the recommended plan. Potential secondary impacts should not limit the wastewater management for a given area. For example, secondary impacts associated with growth should be managed through local zoning, special legislation, sewer service area boundary development (already implemented by the Town) and Town bylaws, not by Title 5 regulations.

In order to manage and operate the proposed wastewater collection systems, the Town will need to implement institutional and other specific management procedures. The recommendations include a Sewer Service Area Management Plan, a Septage Management Plan (SMP), water conservation, stormwater management and nutrient management. These systems and procedures are described in the following sections.

4.1.1 Sewer Service Area Management Plan

A Sewer Service Area Management Plan with a defined Sewer Service Area overlay is recommended. This plan will mitigate potential impacts from future projects and mitigate potential impacts within previously sewered areas.

The Town has already adopted and implemented a Sewer Service Area Management Plan (May 2009) for the existing sewered areas and recommended the Needs Areas (Sewer Service Zones). This plan legally identifies the sewer system boundaries (Sewer Service Area Zones) and sets sewer system policies (via new sewer bylaw). This plan and new bylaw allow the Town to distinguish which properties have the right to connect to the municipal sewer system (final selection of properties that connect to the municipal system will be determined during the preliminary design phases). The updated sewer service area map was approved at the May 2014 annual town meeting. The approval is attached in Appendix F. The primary purpose of this plan is to preserve the existing wastewater infrastructure capacity for the residents and businesses located within the existing collection system area and for residents and businesses located within identified Need Areas (Sewer Service Zones).

The plan addresses issues such as:

- The number of service connections allotted to large parcels of undeveloped land that have frontage adjacent to a sewer line in a Sewer Service Zone or existing sewered area;
- Sewer service to back parcels which do not have frontage on a street that has a sewer;
- Sewer system extension outside of the Needs Areas (Sewer Service Zones).

If interested in the future, the Town could amend its new sewer bylaw by adding limitations to connections within a Sewer Service Zone. This would require special legislative changes to MGL Chapter 83. This is known as a "restrictive" Sewer Service Area Plan.

Communities which have implemented "restrictive" Sewer Service Area Plans include Lancaster, Pepperell and Essex, Massachusetts. These communities have included restrictions within their Districts, such as only allowing:

- Parcels in existence according to the registry of deeds to connect to the system;
- Vacant parcels to have one sewer unit (a three-bedroom house);
- Homeowners of one and two-bedroom homes to expand to three bedrooms, but require homeowners wishing to expand to four or more bedrooms to wait through a five-year moratorium and then apply for a capacity allocation;
- Connections for the existing number of bedrooms and assessing a betterment based on the existing number of bedrooms; and
- Approval for additional connections possible after 5 years, if approved by 2/3 Town Meeting Vote, or at the discretion of the Sewer Authority.

These "restrictions" allow for the sewer design capacity and infrastructure to be calculated based on the existing parcels.

The Town's plan allows for future development to comply with Title 5 and creates managed growth to be "growth neutral". The plan does not promote or hinder growth rather, it allows for growth to be maintained at the existing rate (i.e., implementation of sewer extensions to the Sewer Service Zones does not increase growth beyond what would otherwise be using onsite systems), thus being "growth neutral".

4.1.2 Septage Management Plan

A Septage Management Plan (SMP) with a defined septage management overlay is recommended. A SMP legally identifies the septage management boundaries and allows the Town to set on-site system management policies. A Septage Management Plan will include the areas of Town proposed for long-term on-site wastewater disposal as well as those areas proposed for future infrastructure until such time as the recommended plan is implemented in such areas. The successful long-term sustainability of on-site wastewater disposal systems is dependent on proper operation and maintenance in order to prevent adverse health and environmental impacts. The Sewer Commission must work closely with the Lunenburg Board of Health (BOH) and the Environmental Division of the Nashoba Associated Boards of Health in order to coordinate the development of a SMP. A detail of steps included in implementing a SMP and a description of several municipalities, which have implemented SMP is included in Appendix E.

4.2 CONSERVATION INITIATIVES

Conservation initiatives for the Town fall under two general categories; drinking water conservation; and stormwater management/low impact development. It is recommended that the Town, through the Water District, continue with its overall water conservation program in order to reduce the amount of water consumed and discharged into both the existing on-site wastewater

collection and disposal systems and proposed wastewater collection systems. The goals set by the Town are to promote the efficient use of water through education.

4.2.1 Drinking Water Conservation (Flow and Waste Reduction)

It is recommended that the Town, through the Water District, continue with its overall water conservation program in order to reduce the amount of water consumed and discharged into both the existing on-site wastewater disposal systems and proposed off-site wastewater systems. The goals set by the Town are to promote the efficient use of water through education.

The Town is limited by its current Inter-municipal Agreements (IMAs) regarding how much wastewater it can send to the Fitchburg and Leominster wastewater treatment facilities. The implementation of water conservation devices and programs will result in lower operational costs to each user, and also provide reserve capacity at the receiving treatment facilities should future wastewater needs be identified.

The drinking water conservation program in Luneburg is implemented by the Water District. As stated in the Phase I report, the District has taken several steps to conserve water by initiating a meter replacement program, conducting leak detection surveys and an increasing block rate billing structure. By replacing old water meters, the District will be able to account for a more accurate amount of water used by consumers. Leaks in the water mains are inevitable, but by determining where they occur, the District can ensure that water loss is minimized. Utilizing an increasing block rate billing structure encourages the consumer to minimize water use by increasing the unit price for water as the volume consumed increases. Prices are set for each block of water use.

The Water Supply Assessment Study, prepared for the Lunenburg Water District (District) dated January 2007 reiterates the following suggestions by the MA DEP that the District emphasize the following water conservation techniques:

- Public education;
- Leak detection and water audits;
- Metering;
- Price schedule; and
- Municipal water use.

It is recommended that the Lunenburg Sewer Commission, Department of Public Works, and other applicable entities work in conjunction with the Water District work to promote a water conservation and public education program in order to achieve maximum benefits of the conservation program. The Town should continue to work with the Water District to locate a water withdrawal well outside of the Catacunamaug subbasin. Water supplies should be distributed evenly and throughout the separate subbasins in order to allow the Water District to vary the "stresses" on adjacent aquifers.

4.2.2 Stormwater Management/Low Impact Development

The recommendations for stormwater management include a review of low impact development requirements and reduce the amount of disturbance that triggers required stormwater pollution prevention plan. Stormwater is often a significant component of the water budget and can influence the amount of water transported away from a subbasin. As recommended in the DEP Water Policy, communities, such as Lunenburg, should reduce the amount of impervious surface in new development and use Low Impact Development (LID) techniques to control nutrient impacts, stormwater runoff and increase recharge.

4.2.2.1 Stormwater Management Plan

The Town is currently working to maintain compliance with the 5 year stormwater program outlined by the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination Program (NPDES) Phase II Stormwater Program for Municipal Separate Storm Sewer Systems (MS4).

In July 2003, Lunenburg filed a Stormwater Management Plan (SWMP) with the MA DEP and EPA. Subsequently, the Town filed annual reports to update the plan as required. The last of the required annual reports was scheduled to be filed by May 1, 2008.

This is a program for municipalities that requires:

- Public Education;
- Public Participation;
- Illicit Discharge Detection - (Including a Town regulation/bylaw that prohibits non-stormwater discharges);
- Construction Controls - (Including a bylaw to ensure contractors follow stormwater statutes outlined by the Town. Several Towns outline explicit Low Impact Development (LID) controls in this bylaw);
- Post Construction Controls - (Including a bylaw to ensure that the construction controls are maintained); and
- Good Housekeeping.

The Town was scheduled to be in compliance with the EPA NPDES Stormwater General Permit by May 1, 2008. The Town has already completed several of the required best management practices (BMPs).

In addition, stormwater management should review the amount of water that is used for maintaining landscapes and lawns and ensure that it is used in a manner that minimizes such use through the implementation of sound water conservation and water efficiency practices. The town of Lunenburg is working with the Lake Shirley Improvement Corporation (LSIC) through the MA DEP Section 319 NPS Pollution Grant Program to address run off, fertilizer application, LID techniques and watershed education in the area surrounding Lake Shirley. Lake Shirley has had elevated levels of phosphorus and stormwater/runoff management will help to limit phosphorus discharge to Lake Shirley. For example, the LSIC provides the opportunity for

residents to purchase zero/low phosphorous lawn fertilizer. Improvements to stormwater/LID practices will have the greatest impact on the quality of Lake Shirley in the shortest duration of time.

The Town should continue to work on stormwater and LID practices and review expanding the techniques identified for the Lake Shirley region to the rest of the Town.

4.2.3 Stormwater Bylaw

The Town voted to incorporate two new bylaws at the December 5, 2007 Special Town Meeting to comply with the EPA Phase II Municipal Separate Storm Sewer System (MS4) National Pollution and Discharge and Elimination System (NPDES). The approved bylaws are a part of the mandated five year program. There are two bylaws which address new construction and re-construction and existing illicit discharges into the MS4.

The construction and post-construction bylaw addresses stormwater runoff from any activity that disturbs an acre or more (such as land clearing, development, paving or other change in surface material, construction of a new drainage system or any other activity altering the surface area). The bylaw also includes exemptions (such as normal maintenance of town owned roads, agricultural or forestry land, repair of septic systems, existing landscaping and lawn area, construction of fencing and activities that have received an Order of Conditions from the Conservation Commission). The bylaw outlines permitting procedures, including an application for a Stormwater Management Permit, Stormwater Management Plan, Public Hearings, issuance of a permit by approval and inspections and monitoring, and issuance of Certificate of Compliance. The bylaw also includes the required enforcement procedures, such as requiring Cease and Desist orders from land disturbing activity; maintenance, installation or repair erosion control measures; ongoing monitoring and reporting to the Town; remediation of damage resulting from erosion or sedimentation, non-criminal and criminal penalties when necessary.

The illicit discharge bylaw prevents pollutants from entering the storm drain and prohibits illicit connections and unauthorized discharges to the storm drain system. The bylaw addresses existing and future illicit discharges (dumping or discharging of any pollutant or non-stormwater material), illicit connections (that is directly connected to the storm sewer system) and obstruction or interference (that is directly connected to the storm sewer system). The bylaw includes exempt activities (such as firefighting activities, water line flushing, springs, natural flow from riparian habitats and wetlands, landscape, irrigation or lawn watering, uncontaminated ground water, water from exterior foundation drains, and conditioning condensation or sump pumps and others). The bylaw includes permitting procedures (such as an application for a municipal storm drain connection). The bylaw defines the procedures for inspection and notification of spills and the required enforcement.

4.2.4 Low Impact Development (LID)

It is recommended that the Town consider including low impact development requirements and reduce the amount of disturbance that requires a stormwater pollution prevention plan. Currently, stormwater runoff is managed through a stormwater pollution prevention plan filed

with the Town for construction projects over one acre in area. There are several municipalities in Massachusetts that have reduced the amount of area that triggers the SWPPP process. The Town is concerned with runoff and impacts from stormwater and should review a broader range of construction projects. The stormwater bylaws should be reviewed to include LID standards and nutrient management.

4.3 RECOMMENDATIONS FOR WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

The Town reviewed wastewater needs and numerous wastewater management alternatives as part of the CWMP process. The final recommended plan includes recommendations for wastewater collection, treatment, and disposal. The plan includes revising the existing IMA with Leominster. The following details these recommendations and the potential impacts due to economic, environmental and institutional factors.

4.3.1 Regional Solution to Leominster

4.3.1.1 Leominster

The town of Lunenburg and the city of Leominster have an established IMA for the treatment and effluent disposal of up to 500,000 gpd. Also, the infrastructure between Leominster and Lunenburg was designed based on a minimum 500,000 gpd of flow capacity. The wastewater management plan includes a regional wastewater collection system and discharge to Leominster. The Leominster regional wastewater solution is included in Figure 4-2. This regional solution to Leominster includes Area 4 – Lower Massachusetts Avenue, Area 6 - Baker Station, Area 9 - Lake Whalom, Area 10 - Massachusetts Avenue and Beal Street, Area 12 - Highland Street, Area 15 - Rolling Acres Road, and GMD Area 25 - Pioneer Drive.

4.3.1.2 Collection

The recommended regional wastewater system to Leominster is shown schematically and detailed in this section. Estimated lengths of sewer piping for each Needs Area (Sewer Service Zone) were subcategorized into low pressure pipe, gravity sewer pipe and force main piping. The number and location of pump stations required for conventional sewer systems are also shown for each Needs Area. These estimated quantities are shown in Table 4-1. These quantities will be reviewed and finalized during the preliminary design phase and will be based on actual number of existing developed parcels to be sewered, results of soil test borings and field survey results. The proposed sewer extension layouts for Areas 4, 6, 9, 10, 12, 15 and 25 are included in Figures 4-3 through 4-9, respectively.

N

Sewer Service Zone 4

Sewer Service Zone 10

Sewer Service Zone 12

Sewer Service Zone 15

Sewer Service Zone 9

Sewer Service Zone 6

Sewer Service Zone 25

LEOMINSTER

LANCASTER

Hickory Hills Lake

Lake Whalom

Massapoag Pond

Lake Shirley

NEW WEST TOWNSEND RD
OLD STAGE COACH RD
CHASE RD
WEST TOWNSEND RD
HOLMAN ST
NORTHFIELD RD
HIGHLAND ST
GILCHRIST ST
VALLEY RD
HORIZEN ISLAND RD
ISLAND RD
SOUTH RD
SANDY COVE RD
COVE RD
COVE TER
PARK ST
PENINSULA DR
CRESCENT TER
TOWNSEND HARBOR RD
UNNAMED RD
HEMLOCK TER
HILL TOP LN
BIRCH ISLAND WAY
PINE ACRE RD
HEMLOCK DR
WOODLAND DR
MULPUS RD
CUSHING LN
TURKEY HILL RD
CHESTNUT ST
BEAL ST
SKYLARK LN
PAGE HILL RD
CHARLTON ST
WHITE ST
LAWTON AVE
HOLLIS RD
EASTERN AVE
UPLAND AVE
SUNNYHILL RD
WEST ST
RANGELEY RD
CRESTAVE
CARR AVE
POND ST
KIMBALL ST
CROSS RD
PLEASANT ST
BROWN AVE
WEST ST
GRATTON
YOUNGS RD
RAMGREEN RD
SAW MEW AVE
PIEDMONT AVE
BROWN DR
KILBURN ST
LINCOLN ST
FISH ST
LANCASTER AVE
MEADOW LN
CANTERBURY DR
PINE ST
CROSS ST
ELMWOOD RD
ARBOR ST
PAGE ST
WATT ST
FLAT HILL RD
BURRAGE ST
HOUGHTONS MILL RD
RESERVOIR RD
STONEFENCE RD
PEARL ST
MATT'S
PINE RIDGE RD
AUTUMN RD
PARTY LN
SUNSET LN
GOODRICH ST
GIBSON ST
RUTH ST
ROUND ST
UNNAMED RD
LEOMINSTER SHIRLEY RD
COLD SHIRLEY RD
PIONEER RD
FORT POND RD
UNNAMED RD
VILLAGE AT FLAT HILL
WOODLANDS VILLAGE @ HICKORY HILLS LAKE
TWIN CITY PLAZA PUMP STA.
WEST ST PUMP STA.
MONUMENT ST. PUMP STA.
JAMES AVE. PUMP STA. #2
WASHBURN PUMP STA. #2
PUMP STA. #1
13
2A
2
12
190

Legend

- PS — Exisiting Pump Stations
- Existing Sewer Mains
- Existing Force Mains
- Proposed Manhole
- PS — Proposed Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Low Pressure Main
- Sewer Service Zones
- Parcels
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Stream

0 1,200 2,400 3,600 4,800 Feet

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

Comprehensive Wastewater Management Plan Update

Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zones 4, 6, 9, 10, 12, 15, & 25

PROJ NO:	DATE:	FIGURE:
13382A	Apr 2016	4-2

WRIGHT-PIERCE
Engineering a Better Environment

Sewer Service Zone 4

N

TOWNSEND STREET
NEW WEST TOWNSEND ROAD
CHARLTON ST
CHARLTON STREET
WHITE STREET
WHITE ST
PEARL STREET
THORNDIKE STREET
LAWTON AVE
MONTROSE STREET
PAGE HILL RD
BROADMEADOW DRIVE
PEARL BROOK ROAD
MAPLE PARKWAY
CHASE ROAD
BEAL STREET
BEAL S
PS
2A
TILTON AVENUE
MASSACHUSETTS AVENUE
ANDREW TERRACE
FITCH VIEW AVENUE
HOLLIS RD
HOLLIS ROAD
EASTERN AVE
EASTERN AVENUE
UPLAND AVE
UPLAND AVENUE
Sewer S
Zone
EASANT STREET
WEST ACRES DRIVE
BROWN AVENUE
PRATT STREET
WEST STREET
BUTTONWOOD PLACE
ELECTRIC

Legend

- PS — Proposed Pump Station
- PS — Existing Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Revised Sewer Service Zone 4
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 300 600 900 1,200
Feet

Path: W:\GIS_Development\Projects\MA\Lunenburg\13382_CWMP\MXDs\Fig4-3_24x36.mxd

Comprehensive Wastewater Management Plan Update
Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 4

PROJ NO: 13382A | DATE: Apr 2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 4-3

Sewer Service Zone 6

Sewer Service Zone 6

N

PS

PS

PS

To Fitchburg

To Leominster

JOHN FITCH HIGHWAY

PLEASANT STREET

WEST ACRES DRIVE

RENNIE STREET

PRATT STREET

WEST STREET

BUTTONWOOD PLACE

ELECTRIC AVENUE

JOHN STREET

DANA STREET

NATICK STREET

BURKE STREET

HAMLIN STREET

OTIS STREET

JOSLIN STREET

ELIZABETH STREET

WALLIS PARK

FLORENCE STREET

THE CLEARING

LEISURE AVENUE

WHALOM ROAD

EAST STREET

YOUNGS ROAD

POPLAR STREET

WEATHERBEE STREET

BAKER STREET

KINGMAN STREET

BOUTWELL STREET

RAMGREN ROAD

GRAHAM STREET

SUMMER STREET

PLEASANT VIEW AVENUE

PIEDMONT AVENUE

PIERCE AVENUE

STUART AVENUE

RAVEN STREET

LOURDES DRIVE

STUART COURT

KING AVENUE

F AND L RAILROAD LINE

WOODSOME AVENUE

SARGENT AVENUE

WESTMINSTER AVENUE

GREENWICH AVENUE

NORTH STREET

LAKE STREET

MORNINGSIDE STREET

CULLEN AVENUE

MCKINLEY STREET

AMY AVENUE

HOBSON STREET

SCHILEY STREET

STARR STREET

CRAWFORD STREET

BLUEBERRY LANE

COBBLER DRIVE

Legend

- Proposed Pump Station (PS)
- Existing Pump Station (PS)
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Sewer Service Zone 6
- Subbasins
- Drainage Basins
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 300 600 900 1,200 Feet

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Comprehensive Wastewater Management Plan Update

Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 6

PROJ NO: 13382A | DATE: Apr 2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 4-4

Sewer Service Zone 9

N

MASSACHUSETTS AVENUE
SUNNYHILL ROAD
PS
TYLER DRIVE
EASTERN AVENUE
UPLAND AVENUE
WEST STREET
REDWOOD ROAD
CLIFTON ROAD
RANGELEY ROAD
HOLLIS ROAD
FAIRVIEW ROAD
LEOMINSTER ROAD
CREST AVENUE
ELM STREET
ELECTRIC AVENUE
CARR AVENUE
KIMBALL STREET
PROSPECT STREET
LAUREL LANE
CROSS ROAD
PINE GROVE ROAD
BROWN DRIVE
SAVAGE DRIVE
LAKEVIEW AVENUE
LAKESIDE AVENUE
WILDERWOOD AVENUE
MAIN STREET
WILDER ROAD
CROCKER AVENUE
VALLEYVIEW ROAD
NORMON ROAD
WILDER LANE

Legend

- Proposed Pump Station
- Existing Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Sewer Service Zone 9
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 300 600 900 1,200
Feet

Comprehensive Wastewater Management Plan Update

Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 9

PROJ NO: 13382A | DATE: Apr 2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 4-5

Sewer Service Zone 10

N

NORTHFIELD ROAD
CHASE ROAD
HIGHLAND STREET
HOLMAN STREET
WINDWARD TERRACE
BEAL STREET
SKYLARK LANE
CHESTNUT STREET
MASSACHUSETTS AVENUE
ELECTRIC AVENUE
SUNNYHILL ROAD
WEST STREET
REDWOOD ROAD
CLIFTON ROAD
RANGELEY ROAD
HOLLIS ROAD
CARR AVENUE
CREST AVENUE

PS

Legend

- Proposed Pump Station
- Existing Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Sewer Service Zone 10
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 300 600 900 1,200
Feet

Comprehensive Wastewater Management Plan Update
Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 10

PROJ NO:	DATE:	FIGURE:
13382A	Apr 2016	4-6

WRIGHT-PIERCE
Engineering a Better Environment

Sewer Service Zone 12

N

GILCHRIST STREET

NORTHFIELD ROAD

HOLMAN STREET

CUSHING LANE

TURKEYHILL ROAD

HIGHLAND STREET

CHESTNUT STREET

OAK AVENUE

MASSACHUSETTS AVENUE

PS

MAIN STREET

HILLSIDE DRIVE

MEMORIAL DRIVE

WHITING STREET

TYLER DRIVE

SCHOOL STREET

LEOMINSTER ROAD

LANCASTER AVENUE

ROLLING ACRES ROAD

WEST STREET

STEVENS STREET

FRANCIS AVENUE

FAIRVIEW ROAD

Legend

- PS — Proposed Pump Station
- PS — Existing Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Sewer Service Zone 12
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 300 600 900 1,200 Feet

Comprehensive Wastewater Management Plan Update

Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 12

PROJ NO: 13382A | DATE: Apr 2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 4-7

Sewer Service Zone 15

N

HIGHLAND STREET
CHESTNUT STREET
TURKEY HILL ROAD
OAK AVENUE
NORTHFIELD ROAD
TOWNSEND HARBOR ROAD
MAIN STREET
HILLSIDE DRIVE
PS
MEMORIAL DRIVE
MASSACHUSETTS AVENUE
WHITING STREET
TYLER DRIVE
SCHOOL STREET
LEOMINSTER ROAD
MEADOW LANE
ROLLING ACRES ROAD
WEST STREET
STEVENS STREET
FRANCIS AVENUE
FAIRVIEW ROAD
PAGE STREET
LANCASTER AVENUE

Legend

- PS — Proposed Pump Station
- PS — Existing Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Sewer Service Zone 15
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 300 600 900 1,200
Feet

Comprehensive Wastewater Management Plan Update
Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 15

PROJ NO: 13382A | DATE: Apr 2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 4-8

Lake Shirley

N

GOODRICH STREET

RESERVOIR ROAD

BROOK TRAIL

JOHNSON STREET

RUTH STREET

PARMENTER STREET

ROUND STREET

GIBSON ST

LANCASTER AVENUE

PS

LEOMINSTER ROAD

PAGE AVENUE

PROSPECT STREET

BROWN AVENUE

LEOMINSTER SHIRLEY ROAD

OLD SHIRLEY ROAD

PIONEER ROAD

FORT POND ROAD

Sewer Service Zone 25

To Leominster

KALEVA ROAD

PERRY ROAD

LANCASTER

OLD LUNENBURG ROAD

OLD TURNPIKE ROAD

ROUTE 2

LUNENBURG ROAD

Legend

- PS — Proposed Pump Station
- PS — Existing Pump Station
- Proposed Force Main
- Proposed Gravity Main
- Proposed Low Pressure Main
- Existing Gravity Main
- Existing Force Main
- Sewer Service Zone 25
- Subbasins
- Drainage Basins
- Town Boundaries
- Surface Water
- Wetland
- Stream
- Parcels

Note: Pump stations & force mains are approximate locations based on preliminary elevation estimates.
Source:
Study areas & proposed wastewater infrastructure digitzed by Wright-Pierce.
All other data obtained from the Town of Lunenburg and MassGIS EOEA.

0 500 1,000 1,500 2,000 Feet

Comprehensive Wastewater Management Plan Update

Lunenburg, Massachusetts

Regional Alternative to Leominster Sewer Service Zone 25

PROJ NO: 13382A | DATE: Apr 2016

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 4-9

TABLE 4-1
ESTIMATED QUANTITIES OF SEWER PIPING AND PUMP STATIONS
REGIONAL SOLUTION TO LEOMINSTER

NEEDS AREA	LOW PRESSURE PIPE (LF)	GRAVITY PIPE (LF)	FORCE MAIN PIPE (LF)	GRAVITY PIPE AND FORCE MAIN IN SAME TRENCH	PUMP STATIONS
Area 4	-	11,460	4,280	800	2
Area 6	11,310	940	-	-	-
Area 9	3,160	6,800	380	2,900	1
Area 10	660	6,600	100	1,390	1
Area 12	2,820	5,700	250	300	1
Area 15	-	4,150	250	1,620	1
Area 25	-	2,850	450	6,100	3
Total	**17,950**	**38,500**	**5,710**	**13,110**	**9**

4.3.1.3 Treatment and Disposal

Wastewater treatment and effluent disposal will be managed by the city of Leominster at the Leominster WWTF. The estimated wastewater flow for existing infrastructure in 2036 is 305,000 gpd and the existing IMA with Leominster is currently capped at 500,000 gpd. This allows for an additional flow of 195,000 gpd. The proposed flows are included in Table 4-2. The estimated flow in 2036 is lower than the original Phase IV estimated flow in 2016 because the projected growth was reduced from 32% to 10%.

The flows from the existing infrastructure and the Needs Areas will exceed the existing IMA with Leominster. Hence, the town of Lunenburg will need to negotiate an amendment to the current IMA with the city of Leominster. The total estimated flows for 2036 are 795,000 gpd. We recommend that the Town request additional capacity for planning "Flow capacity contingency" of 25 percent. Therefore, the total IMA amended capacity recommended is 1.0 MGD.

TABLE 4-2
ESTIMATED AVERAGE DAILY FLOWS (2036)
REGIONAL SOLUTION TO LEOMINSTER

NEEDS AREA	ESTIMATED AVERAGE DAILY FLOW (GPD)
Area 4	54,000
Area 6	81,000
Area 9	84,000
Area 10	72,000
Area 12	39,000
Area 15	33,000
Area 25	127,000
Total Proposed Needs Area Flow	**490,000**
Flow Projection for Existing Infrastructure	**305,000**
Total Estimated Flow	**795,000**

The flows above in Table 4-2 contain new and proposed development, I/I, residential build-out, and non-residential build-out estimations.

4.3.2 Regional Alternative to Fitchburg

The updated wastewater management plan eliminates the new regional wastewater collection system and discharge to Fitchburg by re-routing the previous areas to the Leominster system. The areas included in the re-routing are Area 4 - Lower Mass Avenue and Area 10 - portion of Massachusetts Avenue/Beal Street.

4.3.2.1 Fitchburg

The town of Lunenburg and the city of Fitchburg currently have a new IMA for the treatment and effluent disposal of 151,000 gpd. New projections for the existing infrastructure that discharges flow to Fitchburg is 117,000 gpd. This is within the IMA limits and re-negotiation should not be needed.

4.3.2.2 Treatment and Disposal

Treatment and effluent disposal will be managed by the city of Fitchburg at the Fitchburg East WWTF. The estimated wastewater flows for the existing infrastructure to Fitchburg in 2036 are 117,000 gpd. The estimated flows are included in Table 4-3.

TABLE 4-3
ESTIMATED AVERAGE DAILY FLOWS (2036)
REGIONAL SOLUTION TO FITCHBURG

FLOW PROJECTIONS	ESTIMATED AVERAGE DAILY FLOW (GPD)
Build-out of Existing Infrastructure Flow Projection	**67,500**
Flow Projection for Existing Infrastructure	**48,600**
Total Estimated Flow	**117,000**

4.4 ENVIRONMENTAL IMPACTS

The final recommended plan was reviewed for potential direct and indirect environmental impacts. The environmental analysis was based on factors from the DEP CWMP Guidelines and the town of Lunenburg. The factors reviewed are:

- Surface and Groundwater Quality;
- Drinking Water Quality;
- Ability to Retain Water in Watershed;
- Odors, Air Quality and Noise Impacts;
- Wetlands, Flood Plain, and Agricultural Impacts;
- Effects on Endangered and Protected Species;
- Solid/Hazardous Waste Generation including Septage or Residuals Disposal;
- Changes in Development and Land Use Patterns;
- Pollution Stemming from Changes in Land Use;
- Socioeconomic Pressure for Expansion;
- Damage to Sensitive Ecosystems;
- Open Space and Recreation;
- Growth and Development Consideration; and
- Aesthetic Compatibility of the System with the Surrounding Environment and Potential Neighbor Impacts.

Potential impacts to the described direct and indirect impacts were evaluated for the recommended wastewater management plan. The following describes potential direct and indirect impacts.

4.4.1 Direct Impacts

4.4.1.1 Surface and Groundwater Quality

The recommended plan will improve surface and groundwater quality. The recommended plan includes recommendations for additional treatment in areas determined not to be well suited for on-site wastewater disposal systems. The recommended plan includes treatment at monitored and permitted facilities with high quality wastewater effluent (the existing Leominster and Fitchburg WWTFs). This allows for consistent treatment in Needs Areas that are known to have variable site conditions for on-site wastewater disposal systems. Since several Needs Areas have close proximities to water resources, including surface water, groundwater and Zone IIs, wastewater disposal options which achieve the highest practicable levels of treatment should be favored to reduce the current levels of pollution and to curb the threat to natural resources.
The recommended plan will provide benefit to potential degradation or pollution of surface and/or groundwater resources in Lunenburg and bordering towns. The recommended plan will provide better effluent quality in areas determined to have need. Treatment levels, wastewater effluent quality, and nutrient removal will be improved with the removal and/or repair of inadequate and failing on-site wastewater disposal systems, and potential direct and indirect wastewater discharges to surface waters. Indirect discharges potentially contain pollutants and contaminants, which have the potential to cause health and environmental problems.

On-site systems require proper siting to treat wastewater to the regulated standards and on-site systems are only inspected and potentially replaced with an updated system when there is a real estate transfer at an individual property.

A regional treatment facility is manned and monitored daily and provides high level of wastewater treatment and is required to meet daily effluent standards. Wastewater treatment quality for effluent discharged from the Leominster and Fitchburg East WWTFs will be in compliance with the EPA NPDES discharge permits.

4.4.1.2 Drinking Water Quality and Supply

The recommended plan will improve water supplies and drinking water (public and private) quality. The recommended plan includes recommendations for additional treatment in areas determined not to be well suited for on-site wastewater disposal systems. The recommended plan includes treatment at monitored and permitted facilities with high quality wastewater effluent. This allows for consistent treatment in areas that are currently served by private wells and proximate to public drinking water supply Zone II areas of contribution. In addition, the recommended plan provides for groundwater recharge in subbasins that are currently and projected to be stressed subbasins of the Nashua River.

As discussed previously, groundwater resources are potentially threatened by the presence of failing on-site systems. Therefore, wastewater collection system construction would have a net beneficial long-term effect on groundwater quality. Septage management planning would also have a net positive effect on groundwater quality in the town, but the possibility of future system failures would not be eliminated.

Drinking water quality may be negatively affected by poorly sited on-site systems within the zones of contribution for the Town's drinking water wells or proximate to private drinking water wells. Consistent treatment is essential in these areas. On-site systems require proper siting to treat wastewater to the regulated standards. When on-site systems are not properly sited, effluent may not be treated to regulated standards and impact drinking water sources. In areas with private drinking water wells, nutrient loading from on-site disposal systems in densely populated areas may impact water quality even if the system is sited properly. Regional solutions allows for collected wastewater from individual properties within a Needs Area to be treated to a higher level. The regional treatment solutions include effluent discharge outside of Lunenburg public and private drinking water sources.

4.4.1.3 Ability to Retain Water in the Watershed

One of the goals of this CWMP is to recommend a plan that is consistent with DEP's watershed initiative by striving to maintain a water balance within the drainage basin. On-site systems provide for groundwater disposal within the same sub-basin; and the regional wastewater solutions will also discharge to the Nashua River Basin.

4.4.1.4 Odor, Air Quality and Noise Levels

There will be some temporary construction impacts associated with the recommended wastewater management plan. Limiting the hours and days of construction, and setting routes for truck traffic, will mitigate construction impacts. Employing noise and odor control measures in the final design of pumping stations will mitigate these potential impacts. Such measures may consist of locating noise causing equipment, such as standby power generators, inside a sound attenuation enclosure (for exterior installations) or inside of the pump station building. The air from any potential odor generating processes (pump station wetwells) can be directed through odor control equipment prior to discharge to the ambient atmosphere.

The major impacts to air quality and noise would be short-term due to construction and the operation of construction equipment. The extent of impact is dependent on the type of construction and the access roads used by the construction equipment. Sensitive air quality and noise receptor sites, such as residential areas, neighborhoods, schools and elderly housing areas will be identified. Limiting the hours and the days of construction will mitigate the construction noise impacts. Any temporary impacts will be mitigated in the final design.

4.4.1.5 Wetlands, Floodplains and Agricultural Impacts

There is potential for temporary impacts to the 100-foot wetland buffer zone when the recommended wastewater management plan is implemented. The impacts will be temporary and

will be mitigated by erosion, dewatering and sediment control measures during construction. The Conservation Commission and DEP will review all erosion control measures during the Notice-of-Intent (NOI) process. Requirements issued in the Order-of-Conditions (OOC) will be included as contractor requirements in the final plans and specifications.

The regional solutions will include construction along a significant distance. This construction would go through an increased amount of wetland buffer zone areas.

Potential impacts from on-site systems on wetlands should be positive with regard to groundwater discharge. Temporary wetland impacts associated with wastewater system construction will be considered during preliminary and final design. The final recommendations may include several water crossings. The crossings, as well as work in the wetland buffer zones, will be identified under a Notice-of-Intent to provide for DEP and local Conservation Commission input. Mitigation measures and wetland restoration techniques will be used in these areas to eliminate long term impacts. The recommended wastewater management plan has no known impacts to conservation or agricultural lands. The majority of the project is located within existing roadway right-of-ways.

There is potential for impacts to floodplains. The Federal Emergency Management Agency (FEMA) has prepared a Flood Insurance Rate Map (FIRM) and the flood plains are identified in the Phase I report. The areas within the flood plains are included in the Figures for the recommended plan. One hundred-year flood zones primarily occur in the low-lying areas adjacent to stream systems wetlands and waterbodies. Any potential impacts will be mitigated during the final design and permitting process for the recommended plan.

4.4.1.6 Effects on Endangered and Protected Species

A portion of the recommended wastewater management plan is within a priority habitat. Any potential impacts will be mitigated through communication with the Massachusetts Natural Heritage and Endangered Species program. Potential impacts will be temporary and the site will be restored to existing conditions.

On-site wastewater disposal systems may negatively impact the sensitive ecosystems of the areas determined to be of need. On-site systems do not treat wastewater to as high of a level of treatment as centralized or decentralized wastewater treatment facilities. Careful attention during the preliminary and final design stages and specific limits and methods for the contractor to follow during construction will lessen potential impacts to endangered and protect species. To minimize potential impacts, the use of existing roadways and previously disturbed right-of-ways for the installation of pipelines will be maximized.

4.4.1.7 Solid/Hazardous Waste Generation including Septage or Residuals Disposal

Wastewater treatment systems, whether they are on-site septic systems or centralized or decentralized wastewater treatment facilities, treat wastewater and, as a result, generate concentrated residuals in various forms. The concentrated residuals for on-site and decentralized facilities are pumped from the individual properties and transported to a regional treatment

facility. Regional treatment facilities (such as the Leominster and Fitchburg WWTFs) treat and dispose of the residuals at the treatment facility or transport the products to other treatment facilities. On-site systems under a Septage Management Plan or with an I/A system are typically pumped out every two years. Increased maintenance would be required at each individual property and potentially impact the homeowner and surrounding parcels. The recommended solution to extend sewers to regional facilities includes additional wastewater disposal outside of the town of Lunenburg. However, the estimated flows are proportionally small and will not significantly increase septage or residuals at the Leominster and Fitchburg treatment facilities, therefore, only having a relatively minor impact.

4.4.2 Changes in Development and Land Use Patterns

The recommended regional sewer extensions design and layout will be based on wastewater flow estimates from existing developed parcels and those parcels designated as buildable in the future according to the current state land use codes and local zoning. In order to prevent changes in development and land use patterns, the Town will need to continue to regulate potential changes and sewer connections through management techniques, such as the new Sewer Service Area Plan and bylaw, Sewer Connection Policies, Connection Moratoriums (if necessary) and other Town policies (such as Zoning Regulations). A goal of the recommended wastewater management plan is to manage wastewater issues with existing development and existing environmental concerns, while at the same time not serving to promote unmanaged sprawl or unchecked development (secondary growth).

4.4.3 Pollution Stemming from Changes in Land Use

Pollution may arise temporarily while constructing residential, commercial and industrial infrastructure and buildings. Potential changes in development and land use may also cause impact to Town resources and water resources. In order to prevent environmental impacts from changes in land use, it is recommended that the Town regulate potential changes through management techniques and Town policy.

4.4.4 Socioeconomic Pressures for Expansion

Connecting the Needs Areas to existing wastewater infrastructure via additional regional sewer extensions may affect socioeconomics. Construction of the recommended plan can cause pressure to extend the sewer system to areas that does may not have the "need" for sewer service. This can cause additional development and need for increased budget need for school systems, maintenance of roadways, fire protection and other Town services. While introduction of wastewater infrastructure in itself does not serve to promote or deny development, the Town should continue to control the extent to which the wastewater system is extended through management techniques. Accordingly, the Town has already implemented a Sewer Service Area Plan and bylaw, which is intended to manage the Town's municipal sewer system to address specific wastewater management needs for its residents and businesses. The Town should also implement and enforces other management techniques such as Sewer Connection Policies, Connection Moratoriums (if necessary), and Town policies (such as Zoning Regulations).

4.4.5 Damage to Sensitive Ecosystems

Construction of the recommended plan will infringe on wetland buffer zone and priority habitat areas. These impacts will be temporary and project sites will be restored to existing conditions. Any impacts will be mitigated by erosion control measures during construction. The Conservation Commission and DEP will review all erosion control measures during the Notice-of-Intent process. Any potential impacts to species habitat will be mitigated through the Massachusetts Natural Heritage and Endangered Species program.

4.4.6 Open Space, Recreation and Surface Water Impacts

There will be positive long-term impacts on the recreational areas around surface water bodies due to improved water quality. Conditions for swimming, boating, fishing and other water contact activities are expected to improve as part of implementing the recommended plan. Some minor short-term adverse impacts to water quality may result from construction however. Recreational impacts will be temporary in nature, due to the construction noise, traffic access and air quality impacts. The temporary impacts at each site during construction will be mitigated by the requirement for siltation/erosion control systems utilized in all necessary construction areas. The long-term impact of the recommended plan will be positive due to the elimination of potential discharges from on-site wastewater disposal systems in areas identified as not well suited for on-site treatment.

4.4.7 Growth and Development Consideration

The installation of municipal wastewater systems (sewer extensions) can result in induced growth if specific management techniques are not implemented as part of the process. This growth is typically the result of the development of properties that would not be capable of installing a proper on-site wastewater disposal system and were therefore not 'buildable' prior to sewer system construction.

The Sewer Service Area Plan and bylaw implemented in 2009 will help the Town control potential growth outside the limits of the Sewer System Service Area. By limiting access to the properties within the Sewer Service Area, the development of properties outside the sewer service area will remain independent of municipal sewer system connection availability. Decentralized systems may be designed and constructed as a flow-based system, outside of the Sewer Service Area with flows limited according to the individual property land use codes (this would typically a private endeavor with its own DEP Groundwater Discharge Permit).

4.4.8 Aesthetic Compatibility of the Systems with the Surrounding Environment and Potential Neighbor Impacts

The regional solutions have the potential to cause minor temporary impacts regarding ease of access to households, businesses and services during construction. Every attempt will be made to provide access to households, businesses and services during construction. In order to minimize impacts to sensitive environmental areas, wastewater infrastructure routes lying mainly within existing streets will be maximized. Unfortunately, these alignments will equally increase the impact on vehicular traffic patterns, as well as business access in commercial districts.

Traffic impacts due to increased volume from construction vehicles will be realized and roadway construction may have some short-term effect on existing traffic patterns. To minimize these effects, construction documents should require provisions for all work on major roads to be performed so as to allow two lanes of traffic. Work on roads experiencing lesser traffic volumes should include provisions for maintenance of at least a single lane of traffic. Adequate traffic controls should also be provided.

In commercial areas, some temporary impacts during construction could be realized. In these areas such impacts should be minimized by designing pipelines for ease of installation. Such as using low pressure sewers which allow for shallower construction instead of deep, wide trenches often required for gravity sewer mains. Additionally, coordination with businesses during construction to allow continued safe vehicle and pedestrian access during business hours should be maintained.

The impact of the regional solutions on cultural resources may be reviewed by the Massachusetts Historical Commission (MHC) once the final alignments of the sewer extensions have been determined. Impacts to historical resources are expected to be minimal, as the sewer extensions are largely planned within existing roadways and outside of the historical district area.

4.5 POTENTIAL WATER BALANCE IMPACTS

A water balance is an accounting of the withdrawals and discharges of water to a watershed, also referred to as an inflow/outflow analysis. The water balance can be determined by calculating the input, output, and storage changes within surface water bodies, such as reservoirs and subsurface resources such as groundwater. Typically, the major input of water is from precipitation and the major output is evapotranspiration. Additional inputs into the watershed can result from streamflow, infiltration from septic systems and wastewater treatment facilities. Outputs can result from water supply withdrawals, streamflows, and wastewater discharges to facilities in other watersheds or subbasins.

The amount of "stress" that a subbasin may be under is determined by looking at the inflow and outflow of the watershed. The Lunenburg CWMP water balance is focused on the three (3) major subbasins in Lunenburg: Catacunamaug, Falulah-Baker and Mulpus. There are three (3) defined hydrologic stress classifications issued by the Department of Environmental Management (DEM, currently known as the Department of Conservation and Recreation - DCR) guidelines, as described in the draft memorandum: *Stressed Basins in Massachusetts*[1]. The three (3) classifications are:

- High-Stress: net average August outflow equals or exceeds estimated average natural (Virgin) August flow
- Medium-Stress: net 7Q10[2] outflow equals or exceeds estimated natural 7Q10 flow. 7Q10 is the lowest consecutive 7 day stream flow that is likely to occur in a ten year period in a particular river segment.

[1] Office of Water Resources, February 26, 2001.
[2] Glossary.

- Low-stress: no net loss to the subbasin.

The Lunenburg CWMP water balance updates the Nashua River Watershed model (NRW model), which was used for the "*Hydrologic Assessment, Nashua River Watershed*", dated March 2002 and prepared for the DCR-Office of Water Resources. The NRW model is setup for users to input additional flow increases and decreases using year 2000 as the baseline. Specifically, this CWMP water balance update is prepared for the town of Lunenburg for the planning period of 2016 through 2036. The water balance update includes an analysis of the watershed portion within the Town borders.

4.5.1 Wastewater Collection and Discharges - 2006 and 2036 for the Recommended Plan

Wastewater collection and discharge was estimated for each subbasin in years 2006 (original phase IV CWMP) and 2036 (current update 2016), and are included in Table 4-4. The wastewater collection system estimates are calculated as a negative to the water balance, while the wastewater discharges are included in the water balance as a gain to the subbasin where the discharge is located. In some cases, this discharge is to subbasins outside of Lunenburg.

The existing municipal wastewater is discharged to either the Fitchburg or the Leominster wastewater treatment facilities (WWTFs), which are located in the North Nashua River subbasin. The recommended plan includes wastewater discharges to regional treatment systems (Fitchburg and Leominster).

TABLE 4-4
WASTEWATER COLLECTION AND DISCHARGE
FLOWS 2036

Area	Wastewater Collection Flows (-)			Wastewater Discharge Flows (+)
	Catacunemaug Brook	Mulpus Brook	Falulah/Baker Brook Brook	North Nashua River Subbasin
4			47,900	47,900
6			57,800	57,800
9	54,100			54,100
10	71,300			71,300
12		29,900		29,900
15	23,100			23,100
25	241,100			241,100
TOTAL	389,600	29,900	105,700	525,200

4.5.2 Water Balance Summary - 2016 and 2036 for the Recommended Plan

The water balance was calculated using the wastewater flow estimates for the Needs Areas included in the recommended wastewater management plan. The water balance includes estimated impacts based on the current water balance conditions and the estimated water balance conditions resulting from the recommended plan for 2016 and 2036. The water balance

calculations for the recommended plan indicate that the stress levels for each subbasin will remain the same.

4.5.3 Existing Sewer System Capacity Evaluation for the Recommended Plan

A preliminary capacity evaluation was performed on the existing collection system to ascertain if the existing infrastructure (gravity sewers, force mains and pumping station facilities) have the capacity to collect and convey the additional wastewater flows estimated for the recommended plan. The primary focus was the estimated flow to Leominster as the majority of flow estimated will be tributary to the city of Leominster.

We considered existing and proposed flows for each area and reviewed specific "nodes" within the existing collection system for available capacity. The results indicate that five existing pumping stations will need to be upgraded at some time during the implementation of the regional solution to Leominster. The Massachusetts Avenue Pump Stations 2 and 3 and the Dana Street pumping station will require a capacity upgrade. We have assumed that the wetwell sizing will be adequate for each station and that the upgrades will include new pumps, motors, controls and associated electrical upgrades (wiring, generator, etc.). We have included a cost estimate of $110,000 for each upgrade in the capital cost estimate for each affected project to account for potential upgrades.

As a result of the re-routing of Needs Areas 4 and 10F to Leominster, the Electric Avenue and Twin City Pump stations will need to be replaced or upgraded to allow for the increased flow. The forcemain at Twin City will also need to be replaced with a larger size pipe. We have included a cost estimate of $400,000 each for new pump stations and a cost of $270,000 for the new forcemain (approximately 900 feet at $300/LF).

As part of the preliminary design of each project, the Town should review the capacity again with the more specific design information at that time. This will ultimately decide the potential for upgrades to any piping or pump stations.

4.6 PROJECT COSTS AND FINANCING PLAN

The financial requirements necessary for implementation of the recommended wastewater management plan have been estimated. The plan includes an estimate of the costs and a discussion of the availability of any federal, state, local or private funding/financing assistance.

4.6.1 Estimated Project Costs

The planning level cost estimates were calculated for the recommended plan (regional solutions to Leominster). The estimates include capital costs (such as construction, engineering services, and land acquisition), and operation and maintenance (O&M) costs (such as labor, energy, chemicals, sludge disposal, etc.). The O&M costs were calculated as a present worth over the entire planning period (20 years). The costs are not intended to be used as final construction costs, but are intended to be used as a planning level tool and guide for the Town to make

decisions regarding how and when to implement each specific sewer extension. Final design level costs estimates should be based on soil test borings and field survey information gathered and evaluated during preliminary design phase of each sewer extension project.

4.6.2 Regional Wastewater Solutions

The regional solutions include cost estimates for a collection system extension and the Town's share of treatment and effluent disposal at a regional treatment facility. In 2016, the annual sewer charge rate is $4.57 per 100 cubic foot of wastewater discharged to Leominster. The 2016 sewer charge rate is $7.30 per 100 cubic foot of wastewater discharged to Fitchburg. It is assumed that both Leominster's and Fitchburg's sewer rates will increase over the 20-year planning period. At this time, it is not feasible to estimate the percent increase in both sewer rates by 2036.

4.6.3 Wastewater Collection System

Construction costs for wastewater collection systems include costs for conventional sewer systems and costs for low pressure systems (not including individual grinder pumps, this cost will be placed on the property owner). For this CWMP, the estimated costs for conventional systems are further separated into three categories; 8"-12" PVC gravity pipe and 4"-6" DI force main pipe in separate trenches, and situations where gravity and force main piping can be installed in common trench. The estimated costs include costs for excavation, pavement restoration, installing manholes and all other site work and appurtenances resulting from the installation of the pipe.

Wastewater pump station costs were estimated using similar bid prices for typical pump stations with suction-lift or submersible type pumps. Typically, the required footprint for a pump station is approximately ¼ acre. This estimate was used to determine the amount of land needed for all pump stations. The cost estimates for sewer connections include gravity or low pressure sewer stubs; but do not include some private property costs such as necessary changes to the interior/exterior plumbing, septic system abandonment, and grinder pumps.

Construction costs for low pressure sewers include costs for excavation, pavement restoration, installation of air release valves and all other appurtenances. The estimated cost is an average cost for 1-1/2"-3" low pressure PVC pipe. The costs for grinder pump installation will be placed on the property owner in this update to reflect recent construction, unlike previous reports which had the costs placed on the Town. Low pressure sewer single family grinder pump units were assumed to be installed for each developed lot and a cost was estimated from vendor cost information, and typical installation rates for each pump unit. The cost for the grinder pump units includes the pump, electrical panel and hookup, and overall installation. Table 4-5 shows a summary of the estimated unit costs utilized in the estimating process.

The estimated project costs are based on the recommended plan. The project costs are estimated in today's dollars (i.e., present cost). This allows for a review of potential impacts associated with the project cost. Although the CWMP covers a 20 year planning period, project costs should be adjusted as the specific sewer extensions are implemented. Adjusting the cost at the

time a specific project is implemented allows for the proper cost adjustment due to cost changes in construction materials, equipment, and inflation (estimated to be 4%).

TABLE 4-5
COLLECTION SYSTEM UNIT CONSTRUCTION COSTS

DESCRIPTION	UNIT	UNIT COST
8"-12" PVC Gravity Sewer Pipe	LF	$375
4"-6" DI Force Main Pipe	LF	$300
Common Trench Installation (cost for both types of pipe)	LF	$400
Typical Pump Station	EA	$400,000
Land Acquisition	Acre	$175,000
1-1/2"-3" PVC Low Pressure	LF	$225
Grinder Pump Unit	EA	$12,000

4.6.3.1 Costs - Leominster Regional Solution

The Leominster regional solution is broken down into three distinct projects as follows:

Project A - Area 6 - Baker Station, Area 9 - Lake Whalom
Project B – Area 4 – Lower Massachusetts Avenue
Project C - Area 10 - Mass Ave/Beal St, Area 12 - Highland St, Area 15 -Rolling Acres Road
Project D - GMD Area 25 - Pioneer Drive

The estimated capital cost, total present worth cost are as follows: The engineer's opinion of probable construction costs, total present worth cost, and unit cost for this regional solution presented herein is based on the level of project understanding as of the date of this report. The costs are based upon projects of similar nature and do not include work beyond the limits of the analysis. It is recommended that preliminary engineering be conducted prior to establishing a specific budget for appropriation by the authorities in the community. Also, the costs provided do not take into account potential conditions that are not known at this time some potential items that would increase project costs may include contaminated soils, adverse sub-surface conditions, or ledge.

A detailed breakdown of the total present day cost, capital costs, O&M costs, and unit cost (cost per parcel) for each project is included in Tables 4-6 through 4-9, respectively. It must be noted that Project D is the GMD Pioneer Drive Area and is largely commercial/industrial zoned. Hence, it currently has a very small number of parcels (28) associated with it and as such a high unit cost (cost per parcel) results. Accordingly, a unit cost has not been shown.

Unit costs are estimated by dividing the capital cost by the number of units. O&M costs are not included in the unit cost estimates.

TABLE 4-6
COLLECTION SYSTEM UNIT CONSTRUCTION COSTS

PROJECT DESIGNATION	CAPITAL COST[1]	TOTAL PRESENT WORTH COST	PARCEL UNITS	BETTERMENT COST/UNIT
Project A	$10,618,000	$13,584,000	318	$34,000
Project B	$10,581,000	$12,164,000	110	$96,000
Project C	$13,587,000	$16,503,000	285	$48,000
Project D	$6,672,000	$7,582,000	28	-

1. Costs were completed in February 2016 at an ENR of 10181

4.6.5 Financing Plan

An equitable means of recovering these costs would be to recover the cost of any portion of the project that provides a general benefit to the entire community through municipal property taxes; and to recover the cost of public improvements which are of specific benefit to a particular area in the community by betterments. Lunenburg must arrive at a financing solution that is fair, equitable and politically acceptable for the regional solutions. A cost recovery plan will need to be formulated, reviewed, and adopted by the Town prior to the implementation of each Project. Currently, the town uses a 100% betterment method.

Massachusetts General Law, Chapters 80 and 83, describes the general procedure for allocation of costs of specific facilities (as opposed to the costs of general facilities) among property owners through a system of betterments (betterment assessments). If necessary, these betterment assessment schemes may be tailored to address particular needs of a community through the passage of special acts of the Legislature. When considering adoption of such special legislation, however, a municipality must take care to observe the principles of fairness and equity amongst property owners, to avoid challenges to the assessments. Lunenburg has experience with betterments for its first phase of sewer extensions (Contracts 1 and 2 of Phase 1), sewer extensions in 2015, and should draw from this experience going forward with its implementation plan these regional solutions. A betterment plan/cost recovery program must be developed in order to recover the capital costs of any future wastewater infrastructure projects. In developing such a plan, Lunenburg must address the problem of how to equitably apportion the

TABLE 4-7
REGIONAL ALTERNATIVE TO LEOMINSTER - AREA 6 AND AREA 9
PROJECT A

Collection System

Collection Costs

	LP			***Gravity***																
										Gravity Pipe			Force Main Pipe			Combined Trench Pipe				
	G.P.[1]	*$/G.P.*[1]	*cost, $*[1]	*LF*	*$/LF*	*cost, $*	*P.S.*	*$/P.S.*	*cost, $*	*LF*	*$/LF*	*cost, $*	*LF*	*$/LF*	*cost*	*LF*	*$/LF*	*cost, $*	*Total Cost, $*
Area 6	*122*	$ *12,000*	$ *1,464,000*	11,310	$ 225	$ 2,544,750	0	$ 400,000	$ -	940	$ 375	$ 352,500	0	$ 300	$ -	0	$ 400	$ -	$ 2,897,250
Area 9	*38*	$ *12,000*	$ *456,000*	3,160	$ 225	$ 711,000	1	$ 400,000	$ 400,000	6,800	$ 375	$ 2,550,000	380	$ 300	$ 114,000	2,900	$ 400	$ 1,160,000	$ 4,935,000
Subtotal	*160*		$ *1,920,000*	14,470		$ *3,255,750*	1		$ *400,000*	7,740		$ *2,902,500*	380		$ *114,000*	2,900		$ *1,160,000*	$ *7,832,250*

[1] Responsibility of property owners (not the Town)

	Total
	cost, $
Construction Cost Subtotal:	**$ 7,832,000**

O&M Costs

Category		*cost, $*
O&M		$ 78,323
Treatment	*Average flow, gpd*	
Area 6	37,300	
Area 9	34,400	
Total	71,700	
total		
$4.57/100cu.ft		$ 160,000
O&M Subtotal:		**$ 238,000**

Engineering Design and Construction

	%	*cost, $*
	25%	$ 1,958,000
Subtotal		$ 1,958,000

Land Costs

	Acres	*$/Acre*	*cost, $*
Land for PS	0.25	$ 175,000	$ 44,000
Subtotal			$ 44,000

Contingencies

	%	*cost, $*
% of construction	10%	$ 784,000
Subtotal		$ 784,000

Annual to Present Worth Cost

Present Worth Factor @ 4%, 20 yr		
13.59		$ 3,234,000
Present Worth Factor @ 5%, 20 yr		
12.462		$ 2,966,000
Present Worth Factor @ 6%, 20 yr		
11.47		$ 2,729,860

Summary of Direct Costs

	Total *cost, $*
Construction	$ 7,832,000
Engineering Design and Construction Oversight	$ 1,958,000
Land Costs	$ 44,000
Contingencies	$ 784,000
Subtotal of Direct Costs:	$ 10,618,000

TOTAL ALTERNATE COST

	Total *cost, $*
Direct Cost	**$ 10,618,000**
O&M Cost	$ 2,966,000
TOTAL PRESENT COST	**$ 13,584,000**

TABLE 4-8
REGIONAL ALTERNATIVE TO LEOMINSTER - AREA 4
PROJECT B

Collection System

Collection Costs	***LP***						***Gravity***												
										Gravity Pipe			*Force Main Pipe*			*Combined Trench Pipe*			
	G.P.[1]	*$/G.P.*[1]	*cost, $*[1]	*LF*	*$/LF*	*cost, $*	*P.S.*	*$/P.S.*	*cost, $*	*LF*	*$/LF*	*cost, $*	*LF*	*$/LF*	*cost*	*LF*	*$/LF*	*cost, $*	*Total Cost, $*
Area 4	*0*	*$12,000*	*$0*	0	$225	$0	2	$400,000	$800,000	11,460	$375	$4,297,500	4,280	$300	$1,284,000	800	$400	$320,000	$6,701,500
Electric Avenue and Twin City Pump Station Replacement																			$800,000
Twin City Forcemain Upgrade																			$270,000
Subtotal	0		$0	0		$0	2		$800,000	11,460		$4,297,500	4,280		$1,284,000	800		$320,000	$7,771,500

[1] Responsibility of property owners (not the Town)

	Total
	cost, $
Construction Cost Subtotal:	**$7,772,000**

Engineering Design and Construction Oversight	%	*cost, $*
	25%	$1,943,000
Subtotal		$1,943,000

Land Costs	*Acres*	*$/Acre*	*cost, $*
Land for PS	0.50	$175,000	$88,000
Subtotal			$88,000

Contingencies	%	*cost, $*
% of construction	10%	$778,000
Subtotal		$778,000

Summary of Direct Costs	Total *cost, $*
Construction	$7,772,000
Engineering Design and Construction Oversight	$1,943,000
Land Costs	$88,000
Contingencies	$778,000
Subtotal of Direct Costs:	**$10,581,000**

TOTAL ALTERNATE COST	Total
Direct Cost	**$10,581,000**
O&M Cost	$1,583,000
TOTAL PRESENT COST	**$12,164,000**

O&M Costs

Category	*Average flow, gpd*	*cost, $*
O&M		$77,715
Treatment		
Area 4	21,800	
total	21,800	
$4.57/100cu.ft		$49,000
O&M Subtotal:		**$127,000**

Annual to Present Worth Cost

Present Worth Factor @ 4%, 20 yr	13.59	$1,726,000
Present Worth Factor @ 5%, 20 yr	12.462	$1,583,000
Present Worth Factor @ 6%, 20 yr	11.47	$1,457,000

TABLE 4-9
REGIONAL ALTERNATIVE TO LEOMINSTER - AREA 10, AREA 12 AND AREA 15
PROJECT C

Collection System

Collection Costs

	LP			***Gravity***															
										Gravity Pipe			*Force Main Pipe*			*Combined Trench Pipe*			
	G.P.[1]	*$/G.P.*[1]	*cost, $*[1]	*LF*	*$/LF*	*cost, $*	*P.S.*	*$/P.S.*	*cost, $*	*LF*	*$/LF*	*cost, $*	*LF*	*$/LF*	*cost*	*LF*	*$/LF*	*cost, $*	*Total Cost, $*
Area 10	*13*	*$12,000*	*$156,000*	660	$225	$148,500	1	$400,000	$400,000	6,600	$375	$2,475,000	100	$300	$30,000	1,390	$400	$556,000	$3,609,500
Area 12	*28*	*$12,000*	*$336,000*	2,820	$225	$634,500	1	$400,000	$400,000	5,700	$375	$2,137,500	250	$300	$75,000	300	$400	$120,000	$3,367,000
Area 15	*0*	*$12,000*	*$0*	0	$225	$0	1	$400,000	$400,000	4,150	$375	$1,556,250	250	$300	$75,000	1,620	$400	$648,000	$2,679,250
Subtotal	*41*		*$492,000*	3,480		$783,000	3		$1,200,000	16,450		$6,168,750	600		$180,000	3,310		$1,324,000	$9,655,750

[1] Responsibility of property owners (not the Town)

Mass Avenue PS No. 2 and 3 and Dana St Uprade Costs	$310,000
	Total Cost, $
Construction Cost Subtotal:	**$9,966,000**

Engineering Design

	%	*cost, $*
	25%	$2,492,000
Subtotal		$2,492,000

Land Costs

	Acres	*$/Acre*	*cost, $*
Land for PS	0.75	$175,000	$132,000
Subtotal			$132,000

Contingencies

	%	*cost, $*
% of construction	10%	$997,000
Subtotal		$997,000

Summary of Direct Costs

	Total *cost, $*
Construction	$9,966,000
Engineering Design and Construction Oversight	$2,492,000
Land Costs	$132,000
Contingencies	$997,000
Subtotal of Direct Costs:	$13,587,000

TOTAL ALTERNATE COST

	Total
Direct Cost	**$13,587,000**
O&M Cost	$2,916,000
TOTAL PRESENT COST	**$16,503,000**

O&M Costs

Category	*Average flow, gpd*	*cost, $*
O&M		$96,558
Treatment		
Area 10	31,100	
Area 12	15,900	
Area 15	14,300	
total	61,300	
$4.57/100cu.ft		$137,000
O&M Subtotal:		**$234,000**

Annual to Present Worth Cost

Present Worth Factor @ 4%, 20 yr		
13.59		$3,180,000
Present Worth Factor @ 5%, 20 yr		
12.462		$2,916,000
Present Worth Factor @ 6%, 20 yr		
11.47		$2,684,000

TABLE 4-10
REGIONAL ALTERNATIVE TO LEOMINSTER - AREA 25
PROJECT D

Collection System

Collection Costs	***LP***						***Gravity***												
										Gravity Pipe			*Force Main Pipe*			*Combined Trench Pipe*			
	G.P.[1]	*$/G.P.*[1]	*cost, $*[1]	*LF*	*$/LF*	*cost, $*	*P.S.*	*$/P.S.*	*cost, $*	*LF*	*$/LF*	*cost, $*	*LF*	*$/LF*	*cost*	*LF*	*$/LF*	*cost, $*	*Total Cost, $*
Area 25	*0*	*$12,000*	*$0*	0	$225	$0	3	$400,000	$1,200,000	2,850	$375	$1,068,750	450	$300	$135,000	6,100	$400	$2,440,000	$4,844,000
Subtotal	*0*		*$0*	0		$0	3		$1,200,000	2,850		$1,068,750	450		$135,000	6,100		$2,440,000	$4,844,000

[1] Responsibility of property owners (not the Town)

	Total *cost, $*
Construction Cost Subtotal:	**$ 4,844,000**

O&M Costs

Category		*cost, $*
O&M		$48,440
Treatment	*Average flow, gpd*	
total	11,400	
$4.57/100cu.ft		$25,000
O&M Subtotal:		**$73,000**

Engineering Design	%	*cost, $*
	25%	$1,211,000
Subtotal		$1,211,000

Land Costs	*Acres*	*$/Acre*	*cost, $*
Land for PS	0.75	$175,000	$132,000
Subtotal			$ 132,000

Contingencies	%	*cost, $*
% of construction	10%	$485,000
Subtotal		$485,000

Summary of Direct Costs	Total *cost, $*
Construction	$4,844,000
Engineering Design and Construction Oversight	$1,211,000
Land Costs	$132,000
Contingencies	$485,000
Subtotal of Direct Costs:	$6,672,000

Annual to Present Worth Cost

Present Worth Factor @ 4%, 20 yr		
13.59		$992,000
Present Worth Factor @ 5%, 20 yr		
12.462		$910,000
Present Worth Factor @ 6%, 20 yr		
11.47		$837,000

TOTAL ALTERNATE COST	Total *cost, $*
Direct Cost	**$6,672,000**
O&M Cost	$910,000
TOTAL PRESENT COST	**$7,582,000**

capital costs among its system's new users.

As previously noted, the Town has utilized 100% betterments as a cost recovery method for sewer projects in the recent past. The Town used the Uniform Unit Method which is based wholly upon "sewer units". One single-family residence constitutes one "sewer unit". Lands used for use other than single-family residences are converted to "sewer units" on the basis of "single family residential equivalents" based usually on water consumption in accordance with an adopted system.

The cost recovery for the design, construction and implementation of the recommended plan could be paid by a combination of property taxes and betterments. An equitable means of recovering these costs would be to recover the cost of any portion of the project that provides a general benefit to the entire community through municipal property taxes, and to recover the cost of public improvements that are of specific benefit to a particular Needs Area in the community by betterments, or a combination thereof. The town of Lunenburg must arrive at a financing solution that is fair, equitable, and politically acceptable, and codify it through a favorable Town Meeting Vote.

A number of cost recovery decisions need to be made by the Town. To assist with the decision-making process, several cost recovery scenarios have been developed based on projects that are similar to the recommended plan. The scenarios are also based on choices most often made by municipal officials.

4.6.6 Cost Recovery – User Costs

In addition to betterments and taxes, a user charge will also be assessed to each existing and new sewer customer. The user charge will offset annual operations and maintenance costs. The Town currently has a user cost system already in place and will continue to review, adjust and utilize this cost recovery method going forward as the additional sewer extensions are implemented. The current sewer use fee annually is approximately $950.

Other charges for new sewer connections are as follows:

1) Sewer connection fee: $2,250, Residential 3 bedroom
2) I/I fee: $660 (3 bedroom at $230/bedroom)
3) Reserve capacity fee: $617 (3 bedroom at $1.87/gallon)

4.6.6.1 Costs per Equivalent Residential User

The estimated unit costs (cost per parcel) are shown above. Again, these are capital costs per parcel and could be analogous to an average betterment fee if 100 percent of the project cost is to be recovered through the individual parcel owners that receive the opportunity to connect to Town sewer.

The unit costs shown do not include some private property costs and do not include user fees for operation and maintenance of the system. Private property costs and users fees are very project and lot specific and hence cannot be accurately estimated at the planning level. The Town must

recognize that these costs exist and develop such costs specifically for each project moving forward. Additional capacity at both Leominster and Fitchburg will likely include the Town paying for I/I removal.

4.7 INSTITUTIONAL ANALYSIS

The Town revised their bylaws in 2006, and created a Sewer Commission. A Sewer Commission was appointed in September 2006. This Commission administers sewer regulations and sets rates and fees for the Town-owned wastewater infrastructure system. At present, the Town does not own nor operate a municipal wastewater treatment facility. The Town does, however, operate a municipal sewer system that currently collects and discharges wastewater through Intermunicipal Agreements (IMAs) with both the Cities of Leominster and Fitchburg.

All areas of the town presently not connected to the municipal system rely on individual on-site wastewater disposal systems, which are under the jurisdiction of the local Board of Health and state Title 5 rules and regulations (310 CMR 15.000 - The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage, Effective 3/31/95.)

In order to manage and operate the proposed wastewater collection, transmission and treatment facilities, the Town must implement institutional and system management procedures, which are described in the following paragraphs.

4.8 IMPLEMENTATION PLAN

Projects the size of the Lunenburg recommended wastewater management plan must be implemented over a significant period of time and involve multiple construction phases. That is why the regional solutions are broken down into four specific projects as noted previously.

It is best to group construction phases in order of priority. That is, higher priority construction should be completed first, followed successively by lower priority phases of the recommended plan, taking into consideration geographical location and relative proximity of priority Needs Areas. The following construction phasing order is recommended:

1. Project A
2. Project B
3. Project C
4. Project D

The construction phasing indicated herein is a guide only. The Town and Sewer Commission should review and revise the recommended sequencing and phasing plan based on the specific needs and preferences of the citizens. Sewer Commission’s current policy is to wait until

residents in a Needs Area request sewer. Town Meeting vote will ultimately decide how and when the implementation of each project occurs.

The following implementation plan should be used by the Town as a guide to execute the projects. A proposed implementation schedule is included in Table 4-10. The recommended implementation plan going forward generally includes the following tasks:

- Secure funding for the project
- Town Meeting Approval
- Preliminary and Final Project Design
- Permits
- Bidding of Projects
- Construction of Projects

4.8.1 Secure Funding for the Project

The completion of the CWMP will provide assistance in gaining funding from the DEP, State Revolving Fund (SRF) loan program for the construction phase of the projects. Accordingly, the Town should consider pursuit of SRF loan assistance to fund the eligible portions of the recommended plan.

As was the case for this CWMP, the SRF process begins with the submittal of a Project Evaluation Form (PEF). The PEF consists of a series of environmental categories and other topics that document wastewater "need". Point scores are provided based on how complete the answers are; the extent to which needs are documented; and the extent to which the project will address public health and environmental concerns. All PEFs submitted in a particular year are then ranked based on the individual point scores.

Lunenburg will have an approved CWMP thus allowing the recommended wastewater management plan to score and rank more favorably. However, each year there are usually many more projects than funds available, so receipt of a loan is never guaranteed. Projects with the highest point scores are put on a list called the Intended Use Plan or IUP. Such projects will receive SRF funding provided a satisfactory loan application is submitted and other requirements are met, such as favorable Town Meeting action to appropriate funds. In recent years, eligible portions of approved projects have received a 2 percent low interest loan. In general, most aspects of construction are eligible, however, design and permitting costs are not eligible for SRF funds.

4.8.2 Town Meeting Approvals

There are a variety of items that require Town Meeting approval in order to implement the recommended wastewater management plan, including:

- Approval of a Septage Management Plan;
- Approval to make amendments to MGL Chapter 83 (if so desired by the Town);
- Approval to Borrow Funds From the SRF Loan Program;

- Selection of Cost Recovery and Betterment Program; and
- Appropriation of Funding for Design, Bidding and Construction.

4.8.3 Special Legislation

Special legislative action may be necessary for some items and possibly for establishing betterment policies. If necessary, the Town will need to consult with Town Counsel and state representatives to draft proper legislation to affect these provisions.

4.8.4 Permits

In addition to the environmental controls that will be associated with the wastewater management plan, other specific controls and mitigation techniques may be required by some permitting agencies. Such permits may consist of, but not be limited to:

- MEPA Environnemental Impact Report (EIR);
- Step 1 Archaeological/Historical Reconnaissance Survey;
- Conservation Commission Notice-of-Intent;

4.8.5 Historical/Archaeological Impacts

The Massachusetts Historical Commission (MHC) is the state historic preservation office and is authorized by M.G.L. Chapter 9, Section 26-27C to identify, evaluate and protect the Commonwealth's important historic and archaeological resources. A request for review was filed with the Commission during the MEPA review process for potential resources in the project construction areas, so that the Commission could provide information on any relevant locations that should be avoided or protected. There are no codified time limits on project reviews by the Commission.

4.8.6 Notice-of-Intent

The Notice-of-Intent (NOI), submitted to both the local Conservation Commission and to DEP, serves to notify the Conservation Commission of the details of a project involving potential impacts on a wetland resource area. Following receipt of an NOI, the Conservation Commission has 21 days to hold a public hearing, followed by another 21 days from the close of hearing to issue a decision. Regardless of the timing of the public the hearing, the Conservation Commission cannot issue an Order of Conditions (OOC) less than 30 days after the NOI is filed.

TABLE 4-11
PROPOSED IMPLEMENTATION SCHEDULE
LUNENBURG, MA

Task	Duration
CWMP Completion	
CWMP Phase IV Update	1/16-5/16
Management Planning Techniques	
Establish Septage Management Plan	6/16-4/17
Town Meeting Vote to Approve Septage Management Plan	5/17
Coordinate Plan with Stormwater Management Plan	7/17-7/18
Coordinate Plan with Water District Management Plan	7/17-7/18
Amend IMA with City of Leominster	8/16-1/17
Regional Alternative to Leominster	
Project A: Remaining portions of Area 6 - Baker Station & Area 9 - Lake Whalom	
Preliminary Design Report	7/17-6/18
Final Engineering and Design	7/18-11/18
Impact specific permits (MassHighway, NOI, etc.)	12/18-1/19
Bid Construction Project	2/19-3/19
Construction	4/19-7/20
Project B: Area 4 - Lower Massachusetts Avenue	
Preliminary Design Report	7/18-6/19
Final Engineering and Design	7/19-11/19
Impact specific permits (MassHighway, NOI, etc.)	12/19-1/20
Bid Construction Project	2/20-3/20
Construction	4/20-7/21
Project C - Area 10- Mass Ave/Beal, Area 12-Rolling Acres Rd, & Area 15-Highland St	
Preliminary Design Report	7/19-6/20
Final Engineering and Design	7/20-11/20
Impact specific permits (MassHighway, NOI, etc.)	12/20-1/21
Bid Construction Project	2/21-3/21
Construction	4/21-7/22
Project D: Growth Management District - Area 25 Pioneer Drive	
Preliminary Report	7/20-6/21
Final Engineering and Design	7/21-11/21
Impact specific permits (MassHighway, NOI, etc.)	12/21-1/22
Bid Construction Project	2/22-3/22
Construction	4/22-7/23

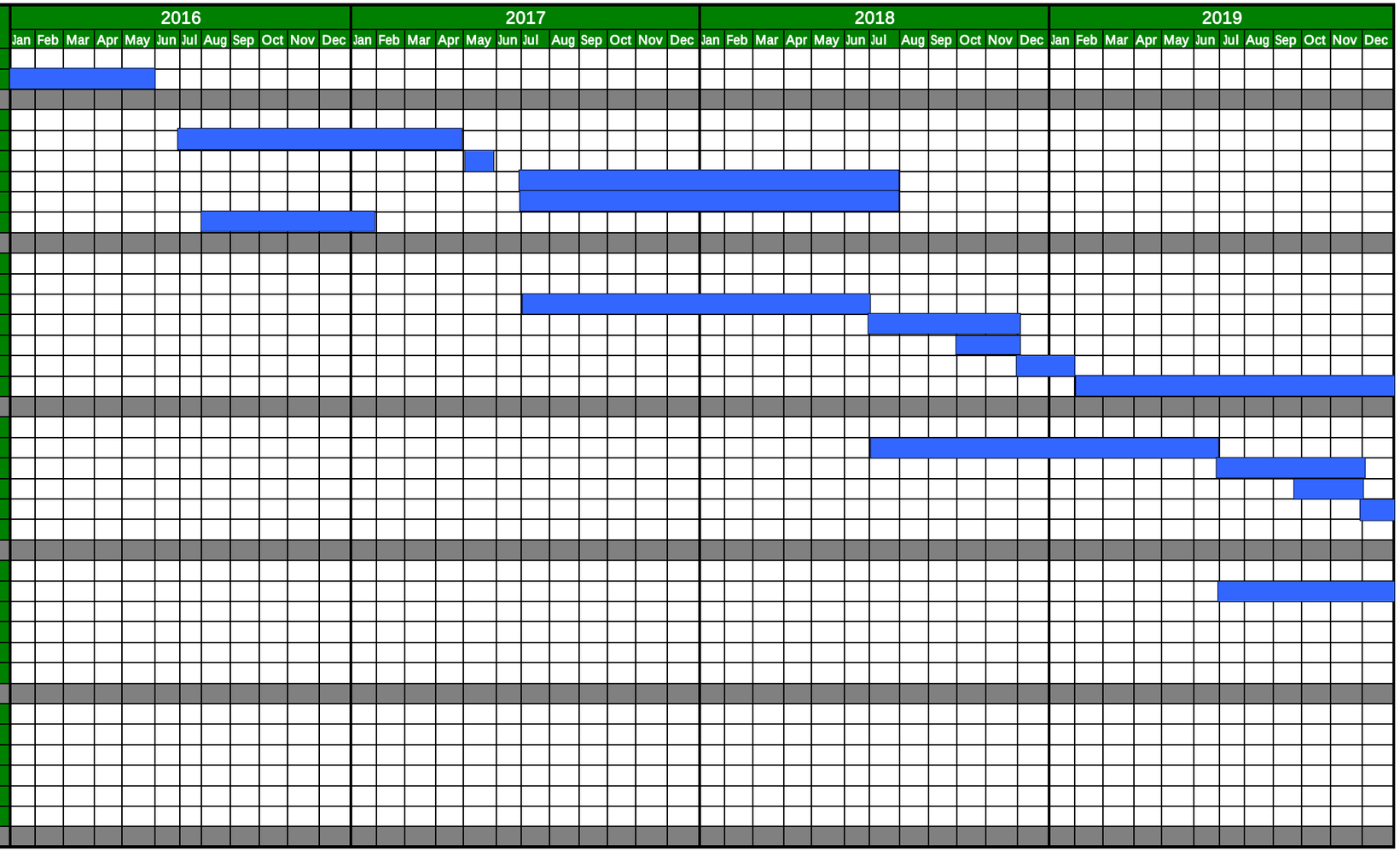
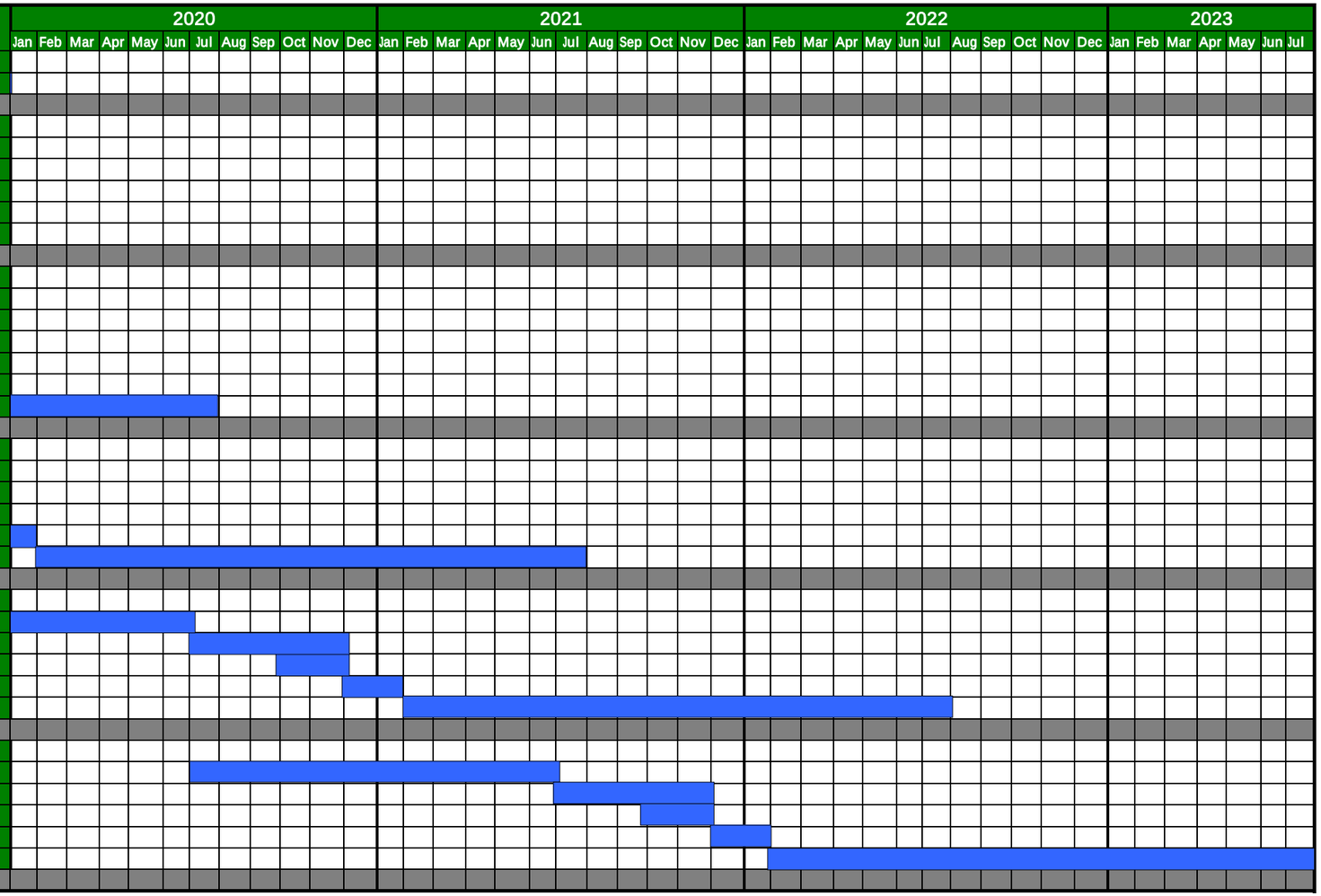


TABLE 4-11
PROPOSED IMPLEMENTATION SCHEDULE
LUNENBURG, MA

Task	Duration
CWMP Completion	
CWMP Phase IV Update	1/16-5/16
Management Planning Techniques	
Establish Septage Management Plan	6/16-4/17
Town Meeting Vote to Approve Septage Management Plan	5/17
Coordinate Plan with Stormwater Management Plan	7/17-7/18
Coordinate Plan with Water District Management Plan	7/17-7/18
Amend IMA with City of Leominster	8/16-1/17
Regional Alternative to Leominster	
Project A: Remaining portions of Area 6 - Baker Station & Area 9 - Lake Whalom	
Preliminary Design Report	7/17-6/18
Final Engineering and Design	7/18-11/18
Impact specific permits (MassHighway, NOI, etc.)	12/18-1/19
Bid Construction Project	2/19-3/19
Construction	4/19-7/20
Project B: Area 4 - Lower Massachusetts Avenue	
Preliminary Design Report	7/18-6/19
Final Engineering and Design	7/19-11/19
Impact specific permits (MassHighway, NOI, etc.)	12/19-1/20
Bid Construction Project	2/20-3/20
Construction	4/20-7/21
Project C - Area 10- Mass Ave/Beal, Area 12-Rolling Acres Rd, & Area 15-Highland St	
Preliminary Design Report	7/19-6/20
Final Engineering and Design	7/20-11/20
Impact specific permits (MassHighway, NOI, etc.)	12/20-1/21
Bid Construction Project	2/21-3/21
Construction	4/21-7/22
Project D: Growth Management District - Area 25 Pioneer Drive	
Preliminary Report	7/20-6/21
Final Engineering and Design	7/21-11/21
Impact specific permits (MassHighway, NOI, etc.)	12/21-1/22
Bid Construction Project	2/22-3/22
Construction	4/22-7/23



4.9 FACILITIES ANALYSIS

The selection of the recommended plan included a careful review and evaluation of all proposed facilities. The final recommendations include phased construction, reliability and flexibility of the regional solutions.

4.9.1 Phased Construction

Phased construction is recommended for the implementation of the recommended plan. A phased construction will allow the Town to spread out the cost of design, bidding and construction, and implementation of each project throughout the planning period. In addition, the recommended plan will be reviewed by the Town departments and committees, such as the Department of Public Works, Board of Selectmen and Finance Committee to determine the financial impacts of the recommended sewer extension projects along with any other Town infrastructure improvement projects, such as roadway improvements and schools. The Town will review the financing methods necessary to implement any recommendations.

The CWMP is a long-term planning document. The Town has the opportunity and flexibility to incorporate any additional information that is developed by Federal, State and/or Local authorities and/or private entities prior to the implementation of the recommendations and adjust the phased construction as appropriate.

4.9.2 Flexibility and Reliability

The sewer extension projects will be designed to be flexible and reliable so that any unforeseen circumstances can be dealt with in a timely manner. All infrastructure systems will be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) "Guide for the Design of Wastewater Treatment Works." The design and layout of the systems should consider not only near term needs, but longer term needs as well.

Facilities will be designed and constructed with the following project goals: (1) Ensure Community Acceptance; (2) Utilization of the Site; (3) Capture and Treat Odors, if necessary; (4) Low Maintenance; and (5) Operate with a Limited Use of Chemicals.

4.10 INSTITUTIONAL ARRANGEMENTS

The recommended wastewater management plan includes several institutional steps the Town will need to have in place prior to implementing additional wastewater infrastructure projects. The institutional arrangements recommended for implementation are as follows:

4.10.1 Establish Sewer Service Areas

The Town has implemented a Sewer Service Area Plan with Sewer Service Zones.

4.10.2 Current Sewer Use Rules

In addition to the new bylaw associated with the Sewer Service Area Plan, the Town updated its Sewer Use Rules and Regulations in order to set the minimum requirements for all users of the Town's wastewater collection system. This enabled the Town to continue to comply with all applicable state and federal laws as well as the requirements of the receiving treatment facilities. Included in these regulations were the provisions for sewer connections and extensions, building sewers, infiltration/inflow, construction requirements, regulation of wastewater discharges, pretreatment of industrial wastewater, permit applications and issuance, reporting requirements, compliance monitoring, enforcement proceedings, service charges and fees. The main purpose of these regulations is to prevent the introduction of undesirable pollutants and to provide standard requirements for all users discharging into the sewer system. Included in this category would be all issues relating to intermunicipal and private flow agreements.

4.10.3 Develop a Cost Recovery Plan

A Cost Recovery Program is recommended in order to recover the capital costs of the proposed new sewer extensions. The Town will need to address the problem of how to equitably apportion the capital costs among its system's users. The cost recovery for the design, bidding and construction of sewer system extensions could include a combination of property taxes and betterments. An equitable means of recovering these costs could be: to recover the cost of any portion of the project that provides a general benefit to the entire community through municipal property taxes; and to recover the cost of public improvements which are of specific benefit to a particular Needs Area in the community by betterments. A cost recovery plan will need to be formulated, reviewed, and adopted by the Town prior to the start of construction of the recommended wastewater management plan.

4.10.4 Current Sewer User Charge System

Sewer user charges are necessary for the Town to recover the annual costs of operation and maintenance associated with the recommended wastewater management plan. Among other things, the system is recommended to be updated to current standards, billing categories and rate structure. Any changes adopted by the Town must meet state regulations for recovery of costs to operate, maintain and repair as necessary the wastewater collection system. The current annual wastewater user cost is approximately $950 in Lunenburg.

4.10.5 Develop a Formal Septage Management Plan

A Septage Management Plan (SMP) with a defined septage management overlay is recommended. A SMP legally identifies the septage management boundaries and allows the Town to set on-site system management policies. This will allow the Town to distinguish which properties will be managed under a Septage Management Plan. A Septage Management Plan will include the areas of Town proposed for long-term on-site wastewater disposal as well as those areas proposed for sewer extension until such time as the recommended plan is implemented. The successful long-term sustainability of on-site wastewater disposal systems is

dependent on proper operation and maintenance in order to prevent adverse health and environmental impacts.

4.10.6 Update Current Water Conservation Program

It is recommended that the Town, and the Water District, continue with its overall water conservation program in order to reduce the amount of water consumed and discharged into both the existing on-site wastewater disposal systems and proposed sewer extensions.

4.10.7 Sewer System Expansion Control Policy

This has been completed by the Town.

4.10.8 Sewer Commission Staffing and Operations Plan

A review of the current and projected Sewer Commission Staffing and Operations Plan is recommended. This plan will review and estimate the current and proposed tasks, responsibilities and staffing requirements for each aspect of the operation and maintenance of the current and proposed wastewater collection system. The relative merits to Town staff versus contract operations should also be evaluated.

4.10.9 Wastewater System Construction Standards

This should be reviewed and changes implemented to allow the Town to maintain standards consistency for all new infrastructure construction projects. There should be a review, discussion and revisions to construction standards as necessary prior to any new construction projects. Spare parts, redundancy, general O & M items and manhole design standards are just a few examples of important construction standards.

4.10.10 Sewer Use Rules and Regulations

Properties which are connected to the town of Lunenburg's wastewater collection system are governed by the Town's "Sewer Use Regulations". These regulations were based largely on the city of Fitchburg's Sewer Use Regulations, and were adopted at the May 7, 2005 Annual Town Meeting. The regulations contain many requirements and limitations on the characteristics of the wastewater which is discharged into the system. These requirements include provisions to allow the wastewater to be effectively treated at the Fitchburg East Wastewater Treatment Facility, such as temperature, as well as limiting the amount of potentially hazardous materials present in the WWTF influent, such as volatile hydrocarbons and heavy metals.

It appears that the Sewer Use Regulations adopted by the town of Lunenburg are more suited to minimize impact from industrial-type wastes. While these types of regulations are necessary for a city like Fitchburg, with significant industrial contributors, to govern its wastewater contributors, many of the requirements do not affect much of the activities of the residential and commercial development in Lunenburg. Given that the responsibility for inspection and approval of sewer extensions has largely shifted from DEP to the municipal level, it is important

that the Town have in place regulations to administer sewer extension permits. At a minimum, the Town should adopt the New England Interstate Water Pollution Control Commission's *Guides for the Design of Wastewater Treatment Works* standards, commonly referred to as "TR-16". This guide contains specific minimum criteria for design and construction of wastewater collection systems, including pipe material, slope, and capacity. Additionally, the Town should review the details and methods of construction used on the Phase 1 sewer projects and apply "lessons learned" from those projects. Details, materials and methods which served the project well could be written into the Sewer Use Regulations. Conversely, specific details for the design or construction of the sewer system which did not perform as desired could be prohibited.

SECTION 5

PUBLIC PARTICIPATION

5.1 RELATIONSHIP BETWEEN PROPONENT AND PUBLIC

A public participation plan was developed for outreach strategies and activities. As part of this task, key contacts, such as municipal officials and representatives of regulatory agencies, were interviewed to identify short and long-term goals, gain an understanding of the issues and concerns related to the project and gauge the level of knowledge and interest about the issues and the project within the community.

One of the most important considerations of the CWMP process has been, and will continue to be, to assure that all interested parties are given the opportunity to be included in the decision-making process. Communication between town officials, business owners, residents, utility companies and state agencies is critical. The public participation approach was designed to solicit input from stakeholders and to identify technical and environmental issues, as well as cost savings measures early on and throughout the process.

5.2 REQUIREMENTS FOR PUBLIC MEETINGS

Public meetings were planned for specific project milestone dates. A public meeting was held on May 17, 2007 at the Town Hall to present and discuss the results of Phase I. It was broadcast on the Town's public access cable channel and attended by several town citizens and board members. A copy of the presentation is included in Appendix G.

Town board meetings were open to the public during Phases I, Phase II, Phase III and Phase IV. Wright-Pierce routinely met with the Sewer Commission, Board of Health, and Planning Board at Town Land Board Workshops and attended other meetings as necessary throughout the process. Notices for all public meetings are posted and citizens are always welcome.

The Town held a public hearing on April 28, 2009 to present and discuss the findings of the Phase IV Final Recommended Plan. The presentation and discussion included the final recommended wastewater management and implementation plan. A copy of the minutes, including questions and answers is included in Appendix H. The summary of the updates to the Phase IV Final Recommended Plan will take place at the Annual Town Meeting in May 2016.

5.3 MEPA PUBLIC COMMENTS

A Notice-of-Project-Change (NPC) was submitted to the Massachusetts Environmental Policy Act (MEPA) Office on March 31, 2008. The NPC included the Phase III Draft Recommended Plan. MEPA noticed the project in the Environmental Monitor, April 9, 2008. The MEPA process for an NPC includes a twenty day comment period and comments were received until

April 29, 2008. The Town received the EOEEA Secretary's Certificate from MEPA on May 9, 2008. The copy of the certificate and the comment letters received are included in the Appendices.

5.4 SUMMARY OF PUBLIC PARTICIPATION

Wright-Pierce continues to work closely with the Town, through the Sewer Commission and other town boards to administer public outreach that is intended to build consensus for the recommended plan.

The Town has established three permanent information depositories for project information to be viewed by the public. These depositories are located at:

1. The Selectmen's Office in Town Hall
2. The Sewer Commission Office in DPW Building
3. The Public Library

WRIGHT-PIERCE
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